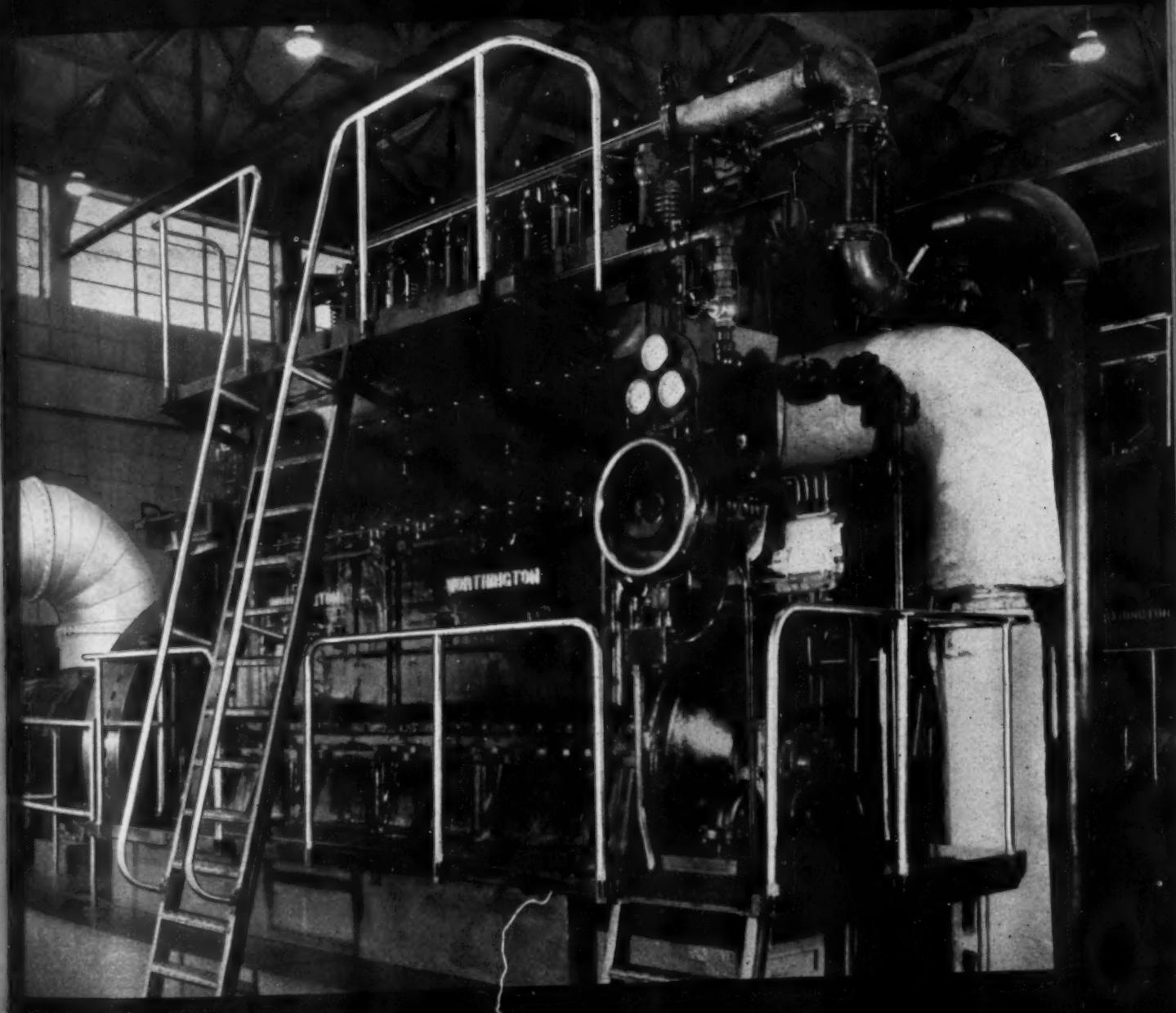
WATER WORKS & SEWERAGE



PENN SALT

LIQUID CHLORINE

A 31-Year Record
of service in the water treatment and sewage disposal fields
WRITE FOR FULL INFORMATION ON PENN SALT LIQUID CHLORINE

OTHER PENN SALT PRODUCTS INCLUDE

Anhydrous Ammonia
Filter Alum · Ferric Chloride
Sodium Aluminate
Chloride of Lime
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PENNSYLVANIA SALT MANUFACTURING COMPANY
Chemicals
1000 WIDENER BUILDING, PHILADELPHIA 7, PA.
NEW YORK · CHICAGO · ST. LOUIS · PITTSBURGH · CINCINNATI · MINNEAPOLIS · WYANDOTTE · TACOMA

WATER WORKS & SEWERAGE, July, 1945, Volume 92, Number 7. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate, United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under act of March 3, 1879.

Empire BALANCED

OSCILLATING PISTON WATER METERS

The balanced oscillating piston—a design exclusive in all EMPIRE Meters

TYPE 12
FROST-PROOF MODEL

TYPE 14
ALL BRONZE MODEL

Performance Proved *Since* 1884

There is no substitute for experience. For over 61 years water meter users have experienced complete measurement satisfaction from the EMPIRE design. Precision and durability are plus values that purchasers have learned to expect. The time-proven EMPIRE balanced oscillating piston principle of positive displacement measurement is responsible for their renowned accuracy and long life.

In the EMPIRE Type 12 (Frost Model) and Type 14 (All-Bronze Model) today's water meter buyer receives the best measurement value ever offered. These meters provide in full the unequalled performance characteristics of the EMPIRE oscillating piston design, plus improvements and refinements resulting from present-day knowledge and engineering advances. Their construction embodies the indicated preferences of many practical water works operating men to whom accessibility and service ease are of the utmost importance.

Investigate metering the EMPIRE way. Get *lasting accuracy* for the *longest life* at the *lowest cost.*

PITTSBURGH EQUITABLE METER CO.
Atlanta — **MERCO NORDSTROM VALVE CO.** — Boston
Chicago — Main Offices, PITTSBURGH, PA. — Houston
Kansas City Los Angeles New York Pittsburgh San Francisco Seattle Tulsa
National Meter Division, Brooklyn, N. Y.

Water Meters

CHECK YOUR CORROSION TROUBLES here

WHICH OF THESE items of sewage treatment and waterworks equipment in your plant are sources of trouble and expense? Look over the list, check the offenders, and arrange to end your troubles . . . with non-rust Everdur*.

This widely used copper-silicon alloy provides years of trouble free service at low over-all cost. Its steel-like strength, high corrosion resistance, ready workability and weldability make possible tough, enduring equipment of lightweight construction.

Look over your plant with a view to replacing corroded or rusted equipment. For detailed information on Everdur, write for publications listed below.

*Reg. U. S. Pat. Off.

Information on *Everdur*

As a first step toward eliminating corrosion troubles, review these publications:

E-11—Everdur Metal for Sewage Treatment Equipment, and Water Works Service.

E-5—Everdur Metal (Applications, Physical Properties and Constants).

E-6—Everdur Bolts, Screws and Accessories.

E-13—Everdur Metal Tanks and Equipment.

E-1—Everdur Casting Ingots.

B-22—Anaconda Electrical Conduit.

BUY WAR BONDS . . . Buy All You Can . . . Keep All You Buy

SEWAGE TREATMENT, RESERVOIR AND WATERWORKS EQUIPMENT

- Coarse and Fine Screens
- Screen Frames
- Float Chambers
- Swing Gates
- Built-up Sluice Gates
- Coarse Bar Rack Aprons
- Effluent Weirs and Scum Weirs
- Structural Scum Baffle Brackets
- Troughs
- Screen Hoppers
- Orifices
- Baskets
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- Float Gage Chains
- Valve Springs
- Manhole Steps
- Guides
- Walkways
- Electrical Conduit
- Flashboard Supports
- Flush Box Fittings
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- Valve Stems

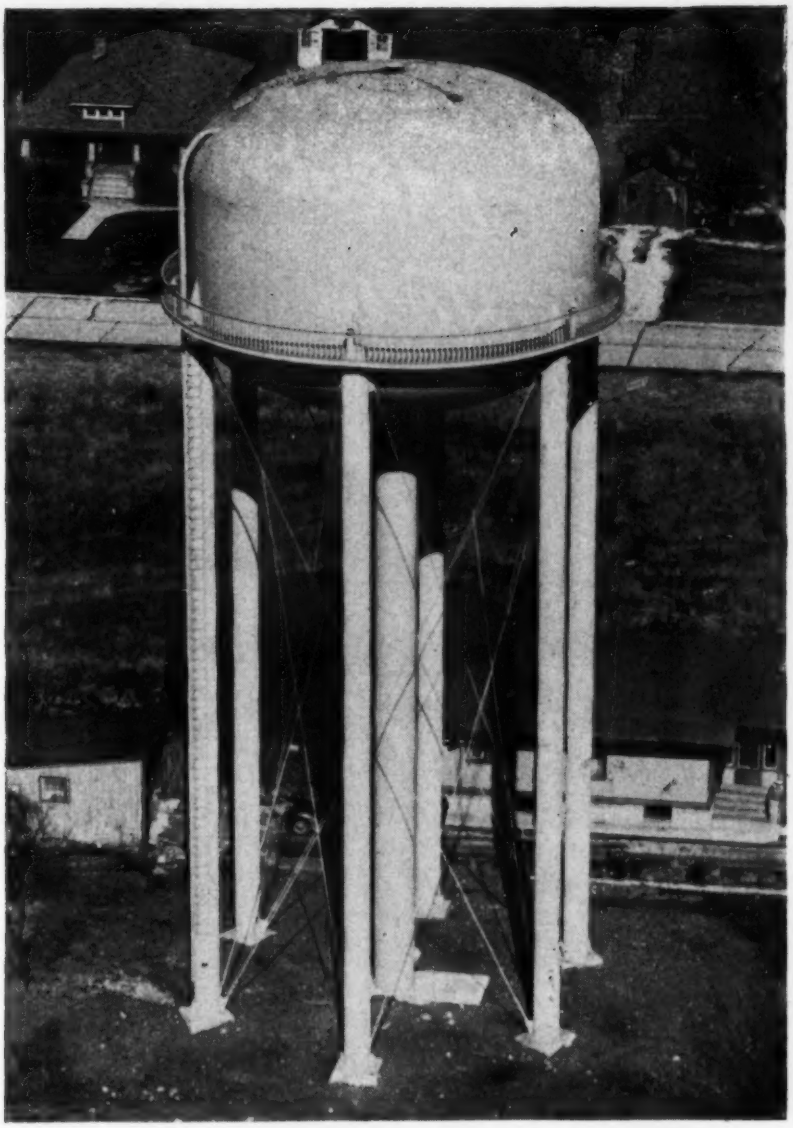
ANACONDA

Everdur Copper-Silicon Alloy

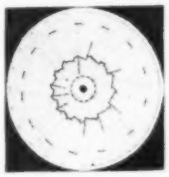
THE AMERICAN BRASS COMPANY—General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company • In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

HOW HORTON ELEVATED STORAGE IMPROVES *Water Pressure*



200,000-gal. Horton water storage tank installed at Lockport, Ill., is illustrated at right.



BEFORE the city of Lockport, Illinois, installed the 200,000-gal. Horton elevated storage tank shown above, water pressures averaged only 16 lbs. per sq. in. in the hilly area, as illustrated in this chart. In addition, difficulty was encountered when the old tank it replaces, a 100,000-gal. unit, required internal cleaning. To do this job it was necessary to put the entire water system on direct pressure before sediment could be removed. This practice not only reduced Lockport's fire protection during the cleaning period, but also added materially to the cost of operation by creating an unusual power outage.

AFTER the new Horton elevated storage tank was installed, as shown in the chart at left, water pressures averaged 13 lbs. greater throughout the *entire system, including the hill areas.* The new tank is equipped with a wash-out valve so that flushing can be done easily, without draining the tank and making it unnecessary to put the water system on direct pressure. Officials of Lockport, Illinois, cited other advantages of Horton elevated storage, too. These men say that the new tank with its all-welded construction and streamlined cylindrical columns is a more easily maintained unit, and that it has a well balanced appearance.

If you would like more information about Horton elevated storage, address our nearest office. Please state the capacity required, height to bottom and location when requesting quotations.

CHICAGO BRIDGE & IRON COMPANY

Chicago 4.....2198 McCormick Bldg.
New York 6.....3390-165 Broadway Bldg.
Cleveland 15.....2262 Guildhall Bldg.
Los Angeles 14.....1455 Wm. Fox Bldg.
Birmingham 1.....1586 North 50th Street

Plants in Birmingham, Chicago and Greenville, Pa.

Tulsa 3.....1646 Hunt Bldg.
Houston 1.....5615 Clinton Drive
Philadelphia 3.....1644-1700 Walnut Street Bldg.
Washington 4.....703 Atlantic Bldg.
San Francisco 11.....1283-22 Battery St. Bldg.

In Canada: Horton Steel Works, Limited, Fort Erie, Ont.

De Laval Labyrinth Wearing Rings contribute in a large measure to sustaining the high efficiency of De Laval pumps. The large clearance, tortuous labyrinth passage reduces leakage to a minimum and maintains ample running clearances under all conditions.

For sustained efficiency and reduced maintenance costs look for De Laval Labyrinth Wearing Rings when buying centrifugal pumps.

3235

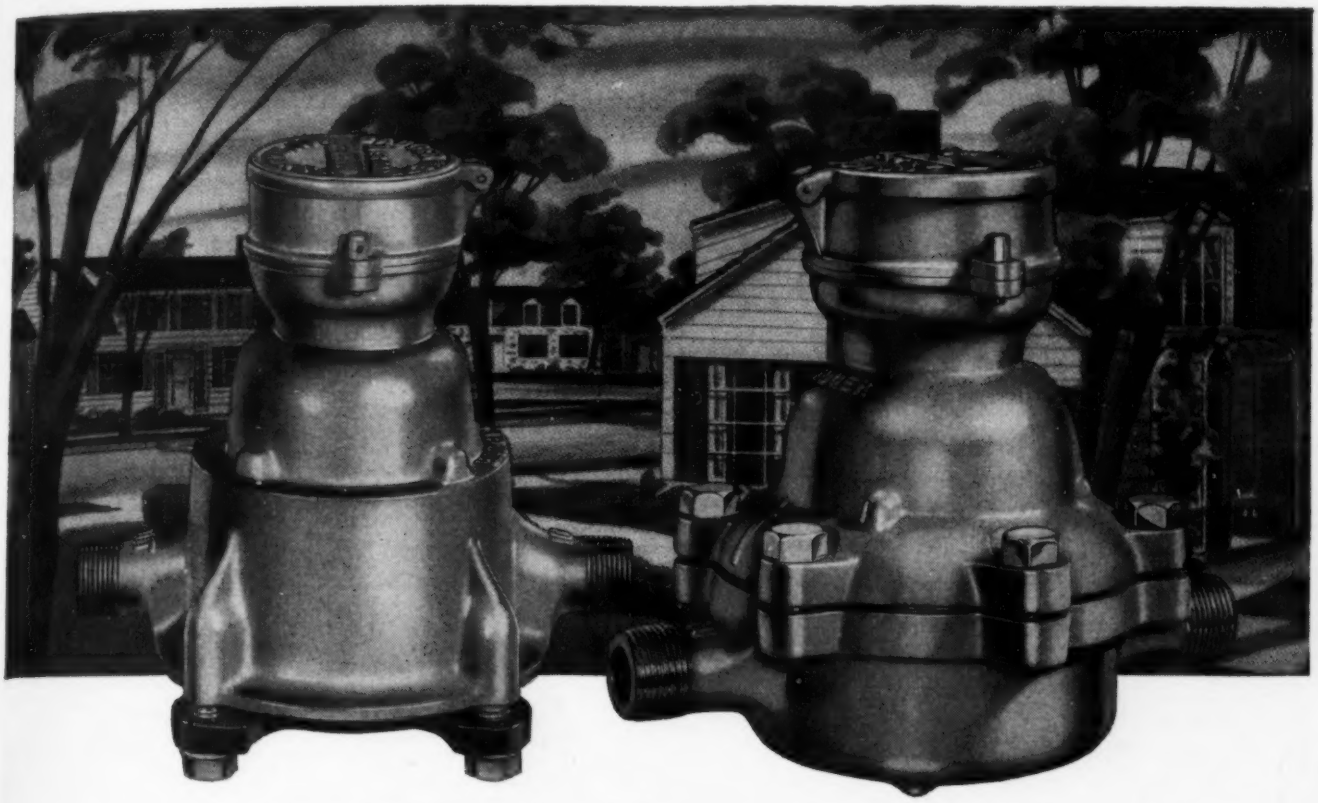
TURBINES • HELICAL GEARS • WORM GEAR SPEED REDUCERS CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS and COMPRESSORS • IMO OIL PUMPS

DE LAVAL

STEAM TURBINE COMPANY · TRENTON 2, NEW JERSEY

SALES OFFICES: ATLANTA • BOSTON • CHARLOTTE • CHICAGO • CLEVELAND • DENVER DETROIT • DULUTH • EDMONTON • GREAT FALLS • HAVANA • HELENA • HOUSTON KANSAS CITY • LOS ANGELES • MONTREAL NEW ORLEANS • NEW YORK • PHILADELPHIA PITTSBURGH • ROCHESTER • ST. PAUL • SALT LAKE CITY • SAN FRANCISCO • SEATTLE TORONTO • TULSA • VANCOUVER • WASHINGTON, D. C. • WINNIPEG

DURABILITY PLUS SUSTAINED ACCURACY FAR BEYOND NORMAL EXPECTANCY!



FOR forty years Badger has built water meters that faithfully measure every fractional cubic foot of water, from the smallest trickle to maximum capacity flow.

Today, under wartime stress, Badger Water Meters are helping water works men to serve their communities and Our Nation — and to maintain accurate metering at commendably low cost.

In your postwar planning, bear in mind Badger Meter's record for sustained accuracy and durability far beyond normal expectancy.

BADGER METER MANUFACTURING CO., MILWAUKEE, WIS.

Branch Offices in: New York City • Chicago, Ill. • Waco, Texas • Portland, Ore. • Salt Lake City, Utah Seattle, Wash. • Cincinnati, Ohio • Kansas City, Mo. • Tampa, Fla. • Savannah, Ga. Los Angeles, Cal. • Philadelphia, Pa. • Denver, Colo. • Worcester, Mass.

Trust the Pipe

The gates of the dam which has been holding back urgently needed water works and sewage works improvements for nearly five war years are opening. Meanwhile, cast iron pipe is obtainable, is being produced in steadily increasing volume without detriment to war orders, and to a limited extent is available from stock on hand for immediate delivery.

We go on record as follows: You can confidently expect to get cast iron pipe when you need it as quickly as any substitute pipe—and quicker, in most instances, since cast iron pipe foundry facilities have remained intact, as they had to, because

THE 10 REQUIREMENTS FOR UNDERGROUND MAINS UNDER NORMAL CONDITIONS

LONG LIFE: In evaluating bids, the useful life of cast iron pipe is figured at 100 years minimum.

CARRYING CAPACITY: The carrying capacity of standard tar-coated cast iron pipe remains practically unimpaired for centuries. For the certain areas where tuberculating water is encountered, cement-lined cast iron pipe is available. Under such conditions, no other material offers the combined long life and sustained carrying capacity of cement-lined cast iron pipe.

TIGHT JOINTS: For *ordinary* pressures, cast iron bell-and-spigot pipe—for *high* pressures, cast iron mechanical joint pipe—are known to be leak-proof.

TENSILE STRENGTH: When tested under hydrostatic pressure to destruction, the ultimate tensile strength of cast iron pipe is a minimum of 11,000 p.s.i. for pit cast pipe and a minimum of 18,000 p.s.i. for cast iron pipe made by other methods.

BEAM STRENGTH: Under beam stress tests, 10 ft. span, standard 6" cast iron pipe sustains a load of 15,000 pounds and bends approximately one inch before breaking.

TOUGHNESS: Under hydrostatic pressure and the impact of a 50 lb. hammer, standard 6" cast iron pipe does not crack until the hammer is dropped four feet.

INTERNAL PRESSURE: An average of many internal hydrostatic pressure tests on standard 6" cast iron pipe shows this pipe withstands more than 2500 pounds pressure per square inch.

EXTERNAL LOAD: In regulation ring compression tests, standard 6" cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

IMPERVIOUSNESS: The walls of cast iron pipe are impervious to leakage, seepage, or sweating of water, gas or chemicals under internal pressure tests.

TAPPING: Cast iron pipe can be tapped cleanly with strong, tough threads, losing little in structural strength.

Other pipe materials meet some of these requirements but only cast iron pipe meets them all.

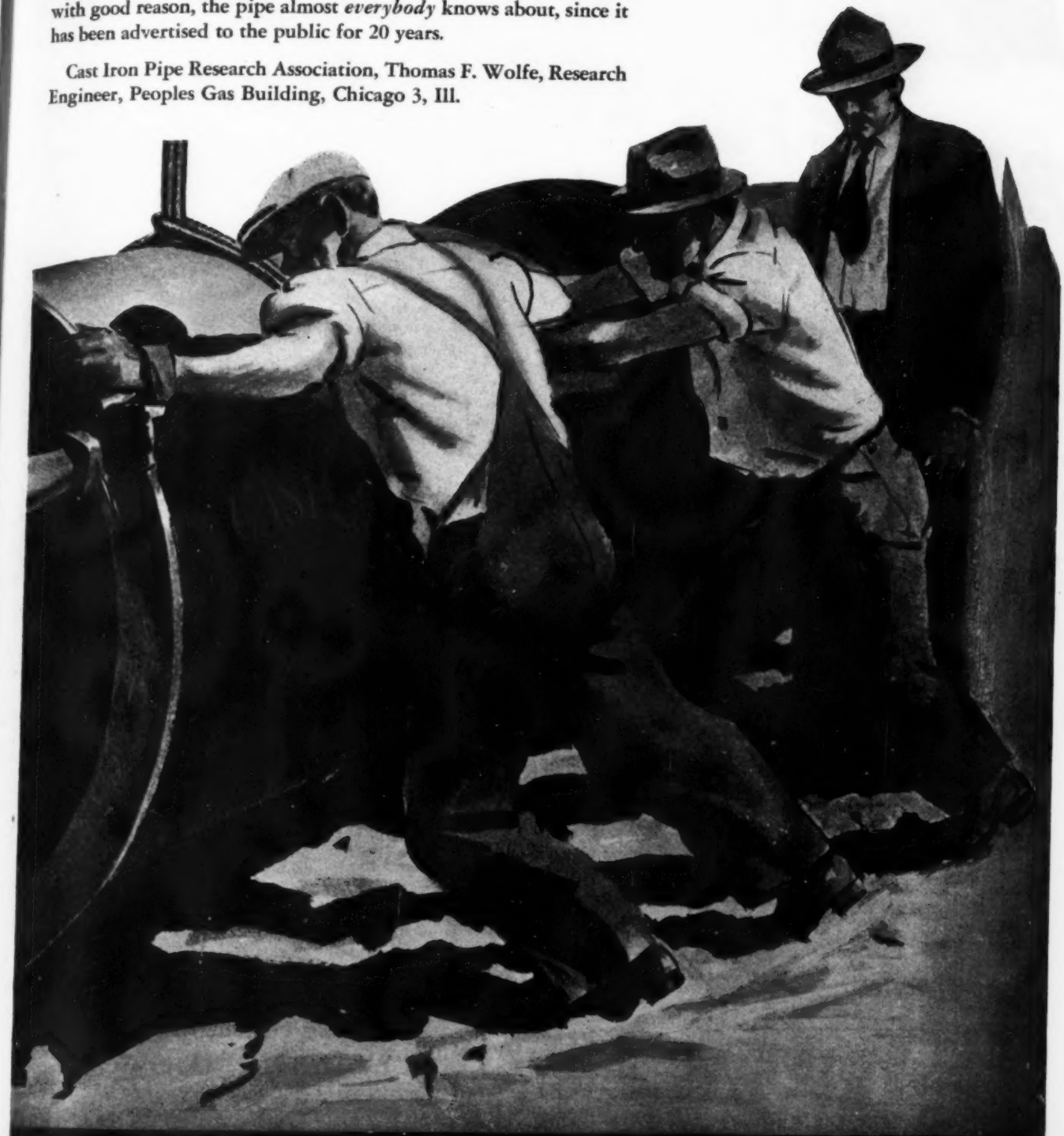
★ ★ ★ CAST IRON PIPE

You Know About

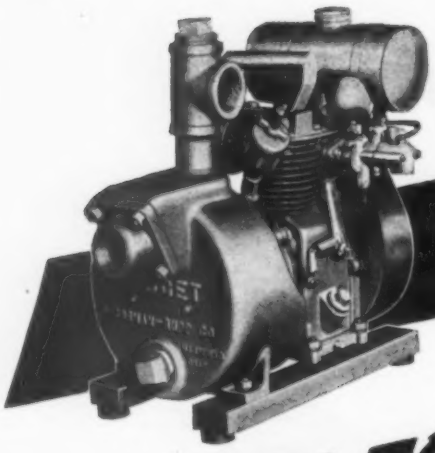
of war construction requirements. *They do not require reconversion.*

Put your trust in pipe you know about—cast iron pipe with its history of long life and low maintenance cost. We might also say, with good reason, the pipe almost *everybody* knows about, since it has been advertised to the public for 20 years.

Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3, Ill.



SERVES FOR CENTURIES ★ ★ ★



HANDY TO MOVE—

BRUTES FOR WORK—

EVERY GORMAN-RUPP IS "A LOT OF PUMP"

There's room on the smallest truck for a Gorman-Rupp pump that will put out 3,000 gallons per hour against a 20-foot head (The Midget). These can handle many small drainage jobs and get to and from the work quickly. For a little larger job there is the Eagle Model – with a weight of only 124 pounds it will pump 15,000 gallons per hour. This same kind of efficiency runs through the entire Gorman-Rupp line. For your big jobs there are heavy duty models up to 125,000 gallons per hour.

All Gorman-Rupps are completely self-priming. Start the engine and you start the water. They can't be clogged with any muck or solids that will pass the intake strainer. They will run months at a time without shut-down, if necessary. The unique Gorman-Rupp efficiency comes from the kind of streamlining that counts – internal streamlining that speeds the flow of water.

There's a size of Gorman-Rupp self-priming centrifugal pump to meet the lightest or heaviest needs but, regardless of size, they're all built to the most rigid requirements of durability.

THE MIDGET – 3,000 gallons per hour; 20-foot total head, 5-foot suction lift; length, 18½ inches, width, 9¾ inches, height, 15½ inches; weight, 60 pounds.

THE EAGLE – 15,000 gallons per hour (20-foot total head, 5-foot suction lift); length, 31½ inches; width, 20 inches; height, 22 inches; weight, 124 pounds.

MODEL 125-M – 126,000 gallons per hour (25-foot total head, 10-foot suction lift); length, 72 inches; width, 36 inches; height, 49 inches; weight, 2250 pounds.

GORMAN-RUPP PUMPS — ARMY & NAVY — UNSURPASSED FOR PUMPING FAST

THE GORMAN-RUPP COMPANY

MANSFIELD . OHIO

Aluminum Grating

IS MAKING GOOD IN A BIG WAY

During these years of man and material shortages, grating made of Alcoa Aluminum is proving especially advantageous. Aluminum's high resistance to corrosion makes protective painting unnecessary. So, many man-hours of work are being saved.

Aluminum grating is designed to provide maximum strength and stiffness, while retaining the ease of handling which light weight gives it. Aluminum is non-sparking, assuring maximum safety where explosive fumes are present. Nonslip surfaces can be included.

Consult your supplier on the possibility of obtaining aluminum grating to replace old grating or for new construction. ALUMINUM COMPANY OF AMERICA, 1955 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

Fairbanks-Morse

Complete Pump Units Serve San Diego

...in New Sewage Disposal Plant

SAN DIEGO, CALIFORNIA, has placed the undivided *responsibility* for its sewage pumping problem on Fairbanks-Morse Pumps. Photo shows the battery of seven sewage pumps—1,000 to 10,000 g.p.m. —which will handle 46 million gallons per day in the new plant. Fairbanks-Morse Vertical Shaft Motors drive these pumps from the floor above. To date the plant is handling up to 26 million gallons a day at a cost of less than $15 per million.

Another city has discovered the advantages of installing Fairbanks-Morse Pumps.

For Fairbanks-Morse Pumps—complete with pump, driver, and base—offer these three vitally important advantages in addition to lasting efficiency:

Combined Responsibility—Designed and built in one factory, pump and driver (motor or engine) are perfectly matched and covered by a single guarantee.

Successful UNIT Performance—Tested in one plant under expert engineering supervision, pumps and drivers assure a superior result to the buyer.

Service from One Source—One engineer is familiar with entire installation—no question of who makes adjustments or required repairs.

To benefit from this undivided responsibility, consult a Fairbanks-Morse engineer. There is no obligation. Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

BUY AND HOLD MORE WAR BONDS

Fairbanks-Morse

A name worth remembering

Diesel Locomotives · Diesel Engines · Generators · Motors · Pumps · Scales
Magnetos · Stokers · Railroad Motor Cars and Standpipes · Farm Equipment

AQUA NUCHAR

goes places . . . does things

Aqua Nuchar Activated Carbon, the *modern* development in water purification, today takes many old-fashioned rides. At the end of a long journey going overseas, it is delivered in special battle dress packages to jungle stations where jeeps, half-tracks or planes cannot be used.

It's important—vitally important—for Aqua Nuchar Activated Carbon to reach its front-line destination because Aqua Nuchar is used not only to assure clear, palatable water for our fighting men, but also to decontaminate water intentionally polluted by the enemy.

Aqua Nuchar, specially packaged for such deliveries, is not prepossessing looking—but inside these sacks lies the carbon with the power of transforming an unpalatable substance into water that is entirely free of objectionable tastes and odors—palatable water to keep our fighting men healthy.

Join Uncle Sam and the hundreds of communities using Aqua Nuchar Activated Carbon. With heavy rains flushing out stagnant and swampy areas on your watershed, be prepared for overnight changes in your water supply.

Aqua Nuchar can be delivered to every American city on short notice. You'll find stocks of Aqua Nuchar Activated Carbon located at strategic points . . . and dealers ready to serve you.

BLUEPRINT NOW

But above all, remember there is a war yet to be won. Maintain equipment to assure operation at 100% efficiency.

NUCHAR — INSURES PALATABLE DRINKING WATER

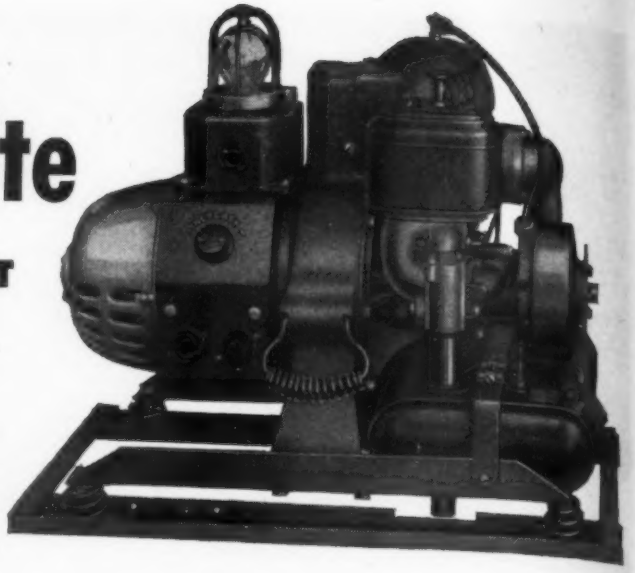
INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP AND PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. · 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS · 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. · 844 LEADER BLDG., CLEVELAND 14, OHIO

Pick Up a Homelite

AND GIVE YOUR MEN A LIFT



For a swift lift in laying pipes use a power hoist operated by a Homelite Portable Gasoline-Engine-Driven Generator. Easily portable, a Homelite gives you on-the-spot power . . . 2000 watts . . . wherever and whenever you need it.

Homelite units cost less to use and maintain because they have a cool running engine that is automatically lubricated by oil which is always new. Morever, Homelites use oversize ball bearings throughout and are equipped with a simplified magneto and automatic built-in governor.

Homelite Corporation

Portable PUMPS • GENERATORS • BLOWERS

PORT CHESTER, NEW YORK

In gauging the potentialities of your future Far West operations . . .

count on Columbia for Alkalies

THROUGH recently acquired Pacific Coast facilities, Columbia brings to the great far west area the efficient and economical production of basic chemicals so beneficial to the entire industrial economy.

The rich alkali deposits at Owens Lake, California—consisting principally of Soda Ash, Borax and Sesqui-Carbonates—are an important addition to other Columbia resources. Their acquisition is characteristic of the progressive policy which seeks to anticipate the growing requirements of customers to the greatest extent possible.

For complete information on our ability to serve your operations in the far west—present or contemplated—you are invited to consult our General Offices, or the most conveniently located District Office.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING • PITTSBURGH 19, PA.

CHICAGO • BOSTON • ST. LOUIS • PITTSBURGH • NEW YORK • CINCINNATI • CLEVELAND
PHILADELPHIA • MINNEAPOLIS • CHARLOTTE • LOS ANGELES

"Revive" Failing Sewers THIS EASY, PERMANENT WAY

Relining failed sewers is easy and quick — and permanent — with long lengths of sturdy Asbestos-Bonded ARMCO Pipe.

★ ★ ★

You can give failing sewers many more years of useful life by relining with durable, easy-to-install Asbestos-Bonded ARMCO Pipe. Job costs are low and the work moves fast. Long lengths of pipe, quickly joined with special inside band couplers, speed the job. Waterway is reduced a minimum because of the relatively thin walls of the corrugated pipe.

Fast as the work goes, you build for *permanence.* Flexible corrugated metal outlaws breakage. Corrosion is shackled by a full bituminous coating tightly bonded to the base metal. A thick bituminous pavement checks erosive action of sewage; makes the bottom last as long as the top.

Use Asbestos-Bonded ARMCO Sewer Pipe for essential repairs now, and design it into your post-war sewerage work. That way you "build for keeps" — provide your community with efficient, lasting, trouble-free sewerage. Our 48-page ARMCO Sewer Booklet will help you in your planning. Just write to Armco Drainage Products Association, 45 Curtis St., Middletown, Ohio.

ARMCO

ASBESTOS-BONDED ARMCO SEWER PIPE

WILL A GOOD STORY STAND REPEATING?

We think so. To many this will be new ... to others, just a profitable reminder!

HOW FIFTEEN YEARS' PUNISHMENT, DELIVERED IN FIFTEEN HOURS

left the "victim" sound and smiling

We took two 12' lengths of Bell & Spigot pipe, jointed them with Tegul-MINERALEAD *and set them up to form a span 19' between supports • Next we rigged a power hammer, a 4 x 4" beam on a fulcrum near one end and actuated by cam and pulley drive • To give it weight, we bolted a 50 lb. chunk of iron to the impact end, which was centered over the* Tegul-MINERALEAD *joint • Power was turned on and for* FIFTEEN HOURS *without pause, the joint was pounded—100 blows a minute—90,000 whamming impacts, each delivering tremendous punishment • Throughout this tough test, 90 lbs. water pressure was maintained in the pipe. At the end of the ordeal, the joint was as dry as at the start.* THERE WASN'T A SIGN OF A LEAK.

THIS test was made to see what jointing with *Tegul*-MINERALEAD could *really stand.*

As a matter of fact, not one joint in fifty thousand would, in fifteen *years* of normal service, undergo anything even remotely approaching the punishment imposed in this fifteen hour test.

So far as good jointing must contribute materially to long service and low maintenance costs, such performance must interest every water works man whose planning includes bell and spigot lines.

Add to this *Tegul*-MINERALEAD's advantages up to time of use:

- 10 LB. INGOT FORM, so easy to store, ship and handle.
- IMMUNITY TO MOISTURE, hence proof against storm and flood.
- NO POSSIBILITY OF PHYSICAL CHANGE, even if jolted in shipment.
- NO SKILLED LABOR or deep bell holes required.

The way to have this good performance, plus these advantages, is to *Specify*

Tegul MINERALEAD

ANOTHER EFFICIENT ATLAS AID in that Main Jointing Job

The HYDE-RO Ring

... a simple, slotted rubber ring device which speeds sterilization of lines, prevents recontamination, saves water and—by damming off flow from leaking valves—makes it easy to pour dry joints. • Made for 4, 6, 8, 10 and 12" cast iron pipe.

A technically qualified ATLAS representative may be reached at our nearest office . . .

THE *Atlas Mineral*

PRODUCTS COMPANY OF PENNA.

MERTZTOWN PENNSYLVANIA

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*CHICAGO 1, Ill., 333 No. Michigan Ave.
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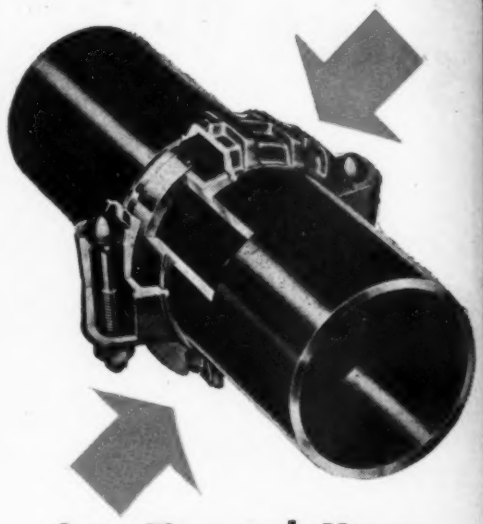
*KANSAS CITY 2, Kan., 1913 Tauromee Ave.
NEW YORK 16, N. Y., 280 Madison Ave.
PITTSBURGH 10, Pa., 4656 Old Boston Rd.
ST. LOUIS 1, Mo., 318 North 8 St.

THE ATLAS MINERAL PRODUCTS COMPANY OF CALIFORNIA, Redwood City, California

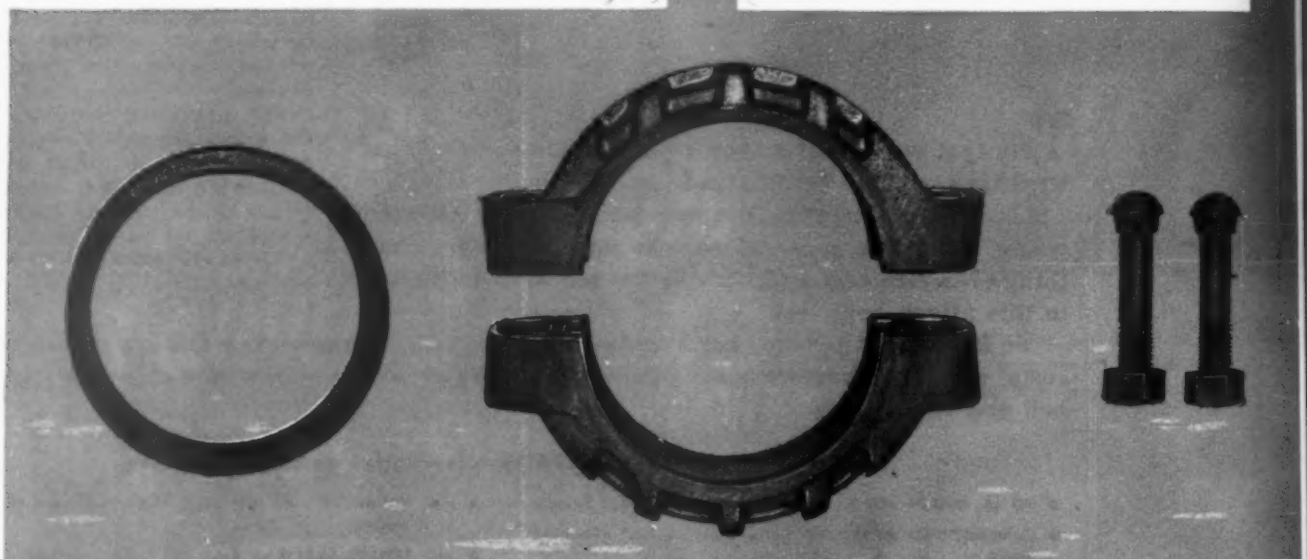
*DENVER 2, Col., 1921 Blake St.
*HONOLULU 2, Hawaii, U. S. A.
SALT LAKE CITY 11, Utah, 1212 So. State St.
*LOS ANGELES 12, Cal., 817 Yale St.
*SEATTLE 4, Wash., 2726 First Ave., South

*Stocks carried at these points

INSTALLATION COSTS HIGH?....



Save Time and Money with Victaulic Couplings



A SINGLE GASKET....TWO HALF-HOUSINGS..TWO BOLTS TO BUTTON

WAR BONDS
A PIPE LINE FROM YOU TO HIM

Simple? Yes. *And cheaper to install.* And *more efficient to operate.* Here's why...

1. The Victaulic Coupling is so simple, it can be fitted rapidly even by inexperienced men—a *saving in skilled man-power.*
2. Victaulic Couplings center themselves *automatically* on the pipe—a *saving in valuable man-hours.*
3. Victaulic Couplings have *built-in flexibility,* which eliminates time-consuming alignment, and enables the pipeline to follow the contours of the ground with a minimum of fittings—a *saving in material.*

For greater pipeline efficiency and economy, use Victaulic Couplings... and the companion line Victaulic Full-Flow Pipe Fittings... THE VICTAULIC COMPANY OF AMERICA, 30 Rockefeller Plaza, New York 20, N. Y. Other Victaulic offices—Victaulic Inc., 727 West 7th St., Los Angeles 14, California; Victaulic Co. of Canada, Ltd., 200 Bay St., Toronto.

VICTAULIC

Reg. U. S. Pat. Off.

SELF-ALIGNING PIPE COUPLINGS AND FULL-FLOW FITTINGS

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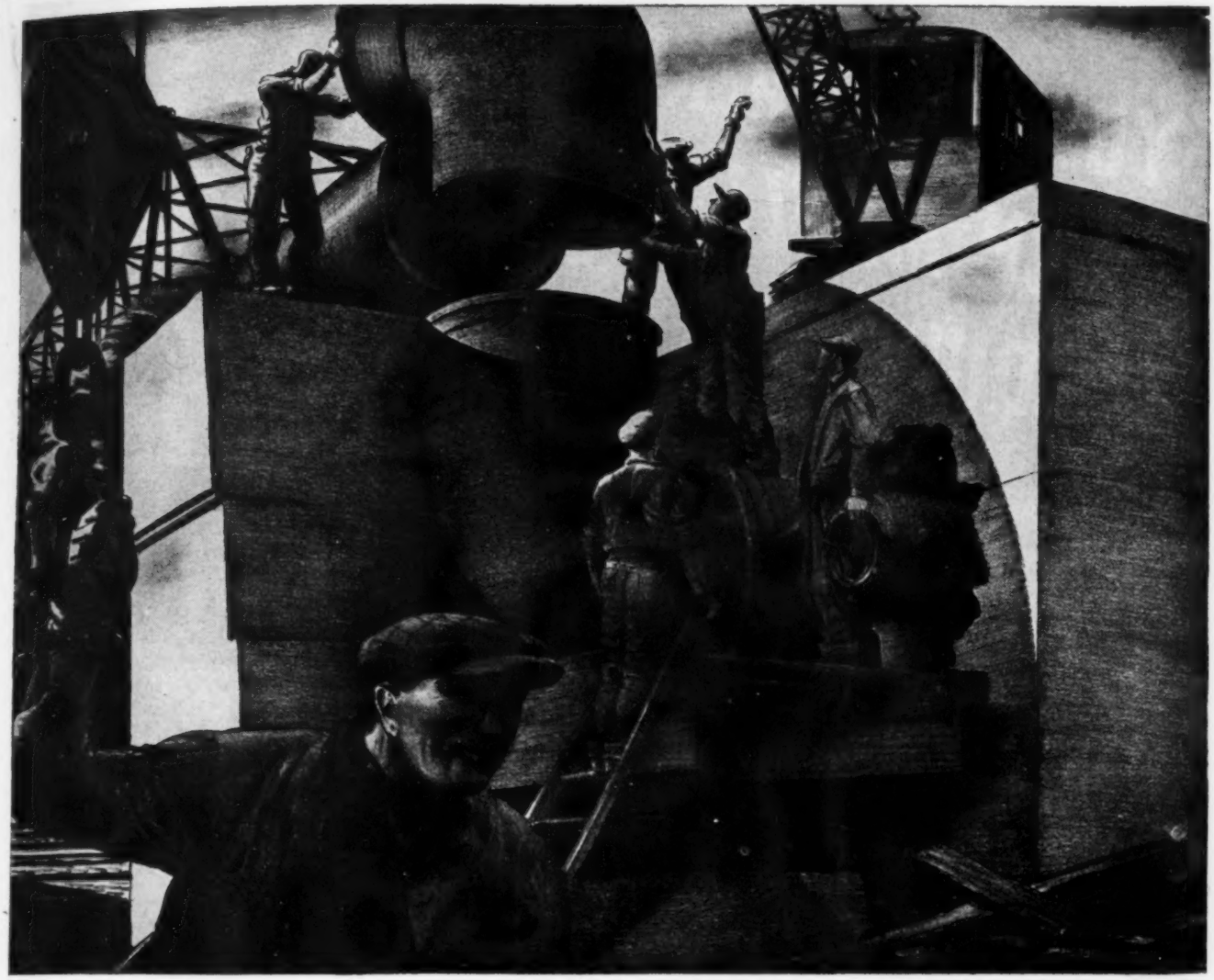
OIL MINING MARINE MUNICIPAL INDUSTRIAL



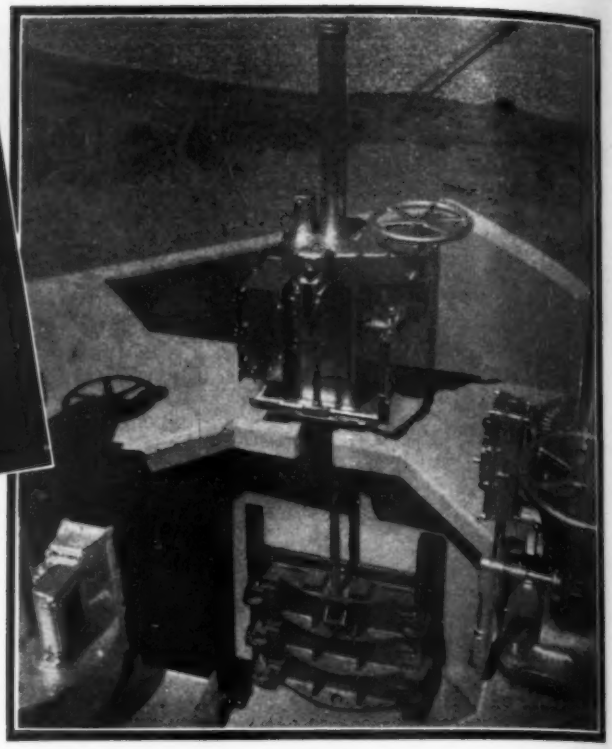
Lithographed on stone by Edward A. Wilson

When requirements call for large diameter cast iron pipe and fittings the pipe buyer has more than ordinary reason to value long experience in pipe design on the part of the producer. A large part of the large diameter cast iron pipe installed in this country during the past 45 years was manufactured in our several plants. With this background of long and varied experience, our technical staffs offer their services in helping to solve pipe design problems.

U.S.
cast iron
PIPE

U. S. PIPE & FOUNDRY CO.
General Offices: Burlington, N. J.
Plants and Sales Offices throughout the U. S. A.

YOU CAN DEPEND UPON *MUELLER* EQUIPMENT



Constant contact with operators in the field has enabled us to design equipment that meets your every need: standardization; quick, economical installation; easy, dependable operation; and low upkeep costs. Eighty-six years of priceless experience and unequalled manufacturing facilities combine to make MUELLER-COLUMBIAN equipment the best that money can buy.

Floor stands for operating sluice gates, valves, etc., may be had in several styles: bench with hand wheel, floor stand, either plain, gear, or power operated. Also made for rising or non-rising stems. Electric models for remote control (shown in photo at upper right) come completely wired ready to attach power leads and control wires. Hand wheel attached for emergency operation in power failures.

MUELLER-COLUMBIAN flap valves and shear gates are made in sizes 4" to 24". Fully bronze mounted to give greater life to moving parts. May be had in three styles of connections: flange, bell, and spigot. Two-foot handle furnished on shear gates unless longer size is specified. Wall fastenings included.

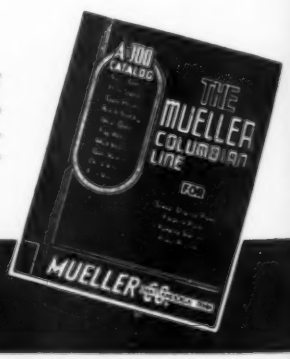
Every MUELLER-COLUMBIAN mud or drain valve has bronze seat, disc ring, and stem. Stem can be furnished with extension stem of any length. Either flat or spigot frame. Special lugs on disc guide its travel and eliminate binding of stem. Sizes 4" to 24".

MUELLER-COLUMBIAN sluice gates come in all standard sizes up to 96", rectangular or circular, with rising or non-rising stem, and with or without adjustable wedges on top, bottom, or sides. May be operated manually, electrically, or hydraulically. Made of tough, even-grained iron properly ribbed for extra strength. Disc, seat, and wedge facings and other parts subject to wear are of everlasting bronze.

MUELLER-COLUMBIAN gate valves for low pressure are built in sizes from 2" to 72" with either rising or non-rising stem and with any type of connection. They are built with extra heavy thickness of section to withstand hard usage, and the famous "FOUR POINT CONTACT" principle insures a tight seat and prevents warping or scraping of discs. Valves can be operated manually or with electric or hydraulic operating mechanisms.

Check valves are gravity type for either vertical or horizontal operation. Fully bronze mounted. Discs faced with bronze, rubber, or leather. Sizes 2½" to 18" . . . Foot valves, stem guides, and brackets are typical MUELLER quality.

The Mueller-Columbian A-300 Catalog gives numerous typical installations, diagrams, suggested layouts, and valuable specifications. Write us for your copy today.



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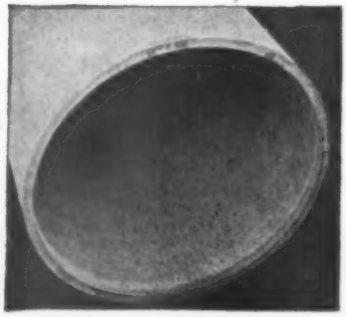

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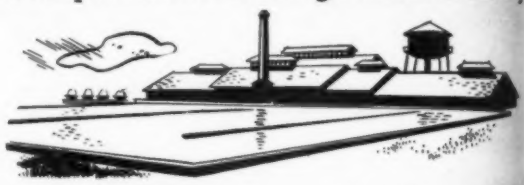

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to aid your planning now

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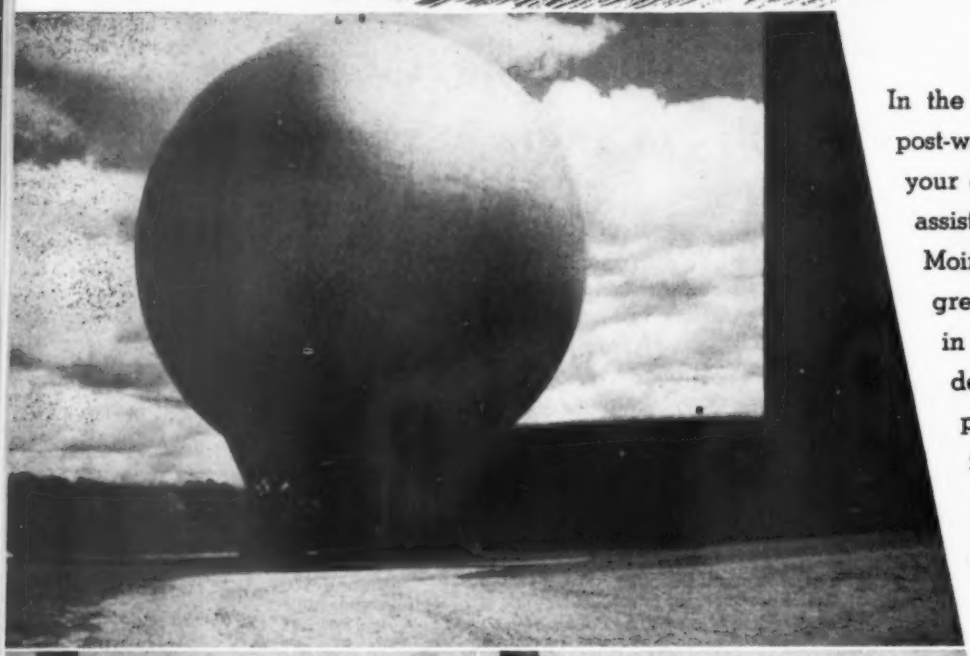
for digester gas storage



In the development of adequate post-war sanitation facilities for your community, the engineering assistance of the Pittsburgh-Des Moines organization can be of great value. Our long experience in this field is your assurance of design excellence that fully interprets your requirements . . . our fabricating and construction skills mean better performance and durability in the completed work. May we suggest a consultation *now*—the first step toward a running start when the municipal building rush begins?

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Visualize the fertilizing value of Your Sludge

The tomato plants shown were raised from seed under identical conditions, except the proportions of sludge used varied. The photograph reproduced was used by the Anderson, Indiana sewage treatment works to advertise its sludge fertilizer. It is almost needless to state that this advertising was quite successful.

Growers of food crops throughout the nation—from the largest commercial growers to Victory gardeners—are fertilizer conscious; the more so because of the scarcity of chemical fertilizers. Every month the demand for greater food production swells as we have more mouths to feed overseas. More food means more fertilizer; with every possible source fully utilized. Sewage treatment plants with Royer Sewage Sludge Disintegrators are finding ready local markets for all the fertilizer they can produce.

Operated by one man, the Royer reduces sludge cake to pea size, removes trash, aerates and further dries the sludge; discharging an effective, ready-to-use fertilizer. The sale of this fertilizer is highly profitable as the labor is less than that required to incinerate or bury the sludge.

The Royer is a rugged, trouble-free, inexpensive machine. Twelve models—electric motor, gasoline engine or belt-to-tractor driven—to meet the needs of every sewage works.

Write for our "Sewage Sludge Utilization Datalog."

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PIONEERS IN THE SALVAGE OF SEWAGE SLUDGE

ROYER FOUNDRY & MACHINE CO.

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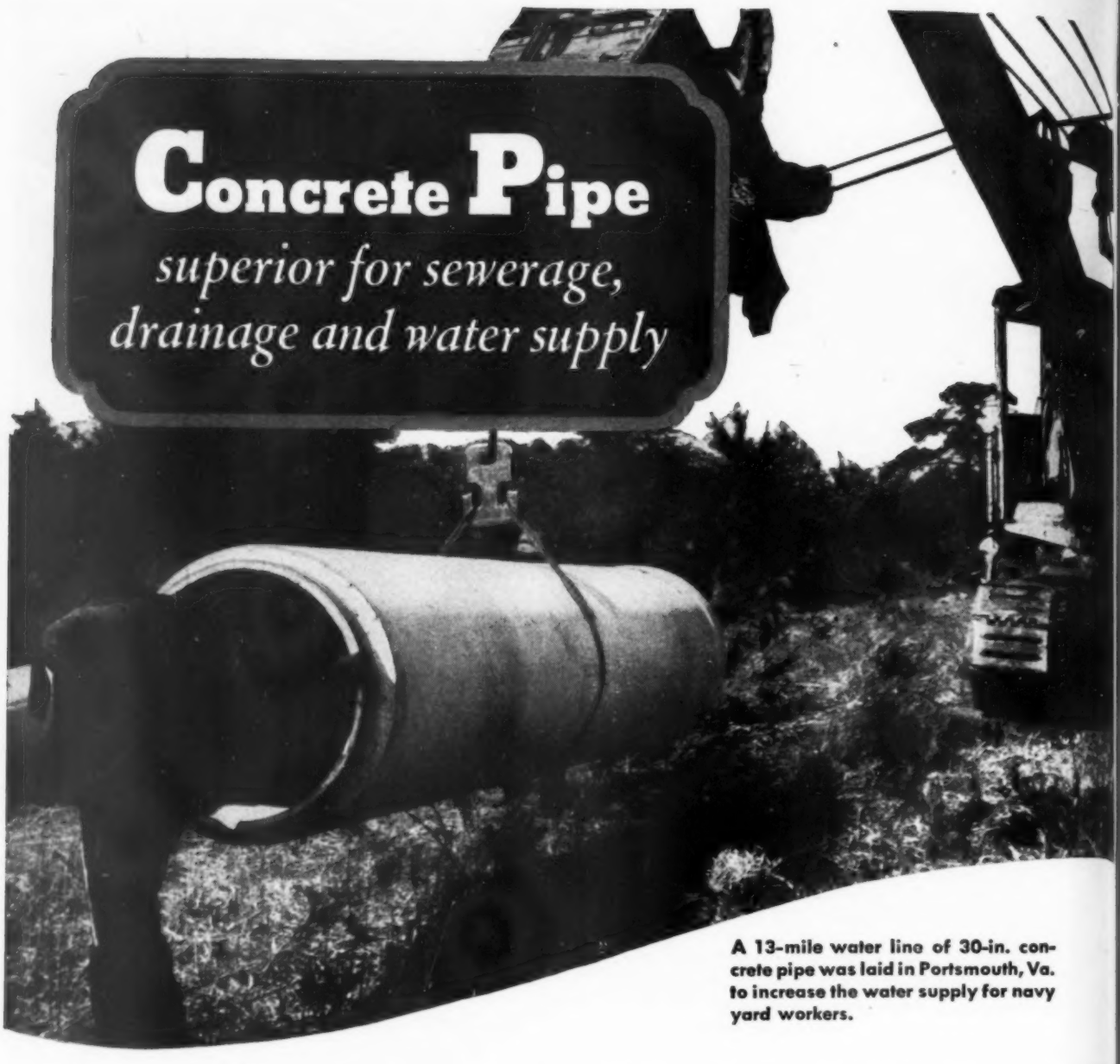

A 13-mile water line of 30-in. concrete pipe was laid in Portsmouth, Va. to increase the water supply for navy yard workers.

The durability and economy of concrete pipe for drainage and water needs has been demonstrated by the long service records of thousands of installations.

Concrete pipe offers these outstanding advantages for airport, highway or land drainage systems; water lines, culverts, storm or sanitary sewers:

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HIGH WEAR RESISTANCE to abrasion caused by suspended grit in high velocity flow.

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Technical assistance is available to engineers and officials engaged in wartime drainage or sanitary projects or who are now planning postwar construction.

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A national organization to improve and extend the uses of concrete ... through scientific research and engineering field work

Buy more war bonds

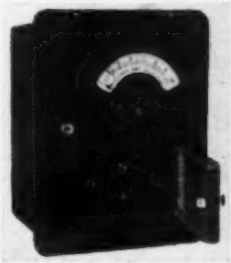
CHECK through almost any article on modern water and sewage treating methods and notice how many of the operations depend upon accurate pH control for maximum treating efficiency.

A "Must" for Modern Water Treating Operations... BECKMAN pH CONTROL!

Because Beckman Glass Electrode pH Equipment has pioneered one important pH advancement after another, it is widely recognized as the most advanced pH equipment available for all types of water and sewerage treating plants. It is installed in plants—both large and small—throughout the country.

No matter whether you are building a new plant or modernizing an older one—and regardless of its size—it will pay you to get the complete story on how Beckman pH equipment will step up efficiencies and cut costs on *your* operations.

Our trained engineers have had wide experience in this type of application and will gladly consult with you and make recommendations on the most efficient methods of solving *your particular* pH control problems. This service incurs no obligation. Write us outlining your pH problems.



This Beckman Automatic pH Indicator is the most advanced pH instrument available. Fully automatic, it gives continuous indication of pH and also operates standard types of potentiometric recording and controlling equipment.

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ONE OF THE LARGEST water treating operations in the country—the Los Angeles Metropolitan Water District—uses Beckman pH Equipment throughout to insure maximum efficiency of its treating operations. This is but one of many similar Beckman pH installations in treating plants, large and small.

Typical curves showing effect of pH upon turbidity removal. Accurate pH control is essential for efficient coagulation and minimum chemical cost on all types of treatment.

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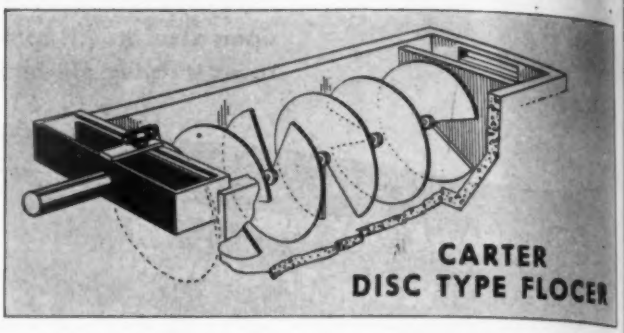
CARTER *CONTROLLED* Flocculation

Guaranteeing positive mixing, elimination of short circuiting, and a minimum of power consumption. This distinctly different method of floc formation that the CARTER FLOCER employes has shown it will give greater savings in chemicals, improved mixing and an increase in overall plant efficiency.



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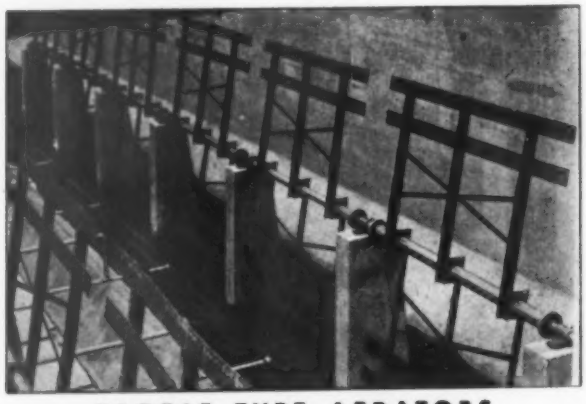

PADDLE TYPE AERATORS

For certain application, or where specifications require, CARTER manufacturers a paddle type mechanism for aeration or flocculation. The illustration at left shows this type being installed in 1939 at the Hackensack, N. J., sewgae treatment plant. Other mechanisms of both the horizontal and vertical types are available for water purification or sewage treatment.

• **Write for detailed bulletins describing above equipment.**

RALPH B. CARTER CO. HACKENSACK, NEW JERSEY
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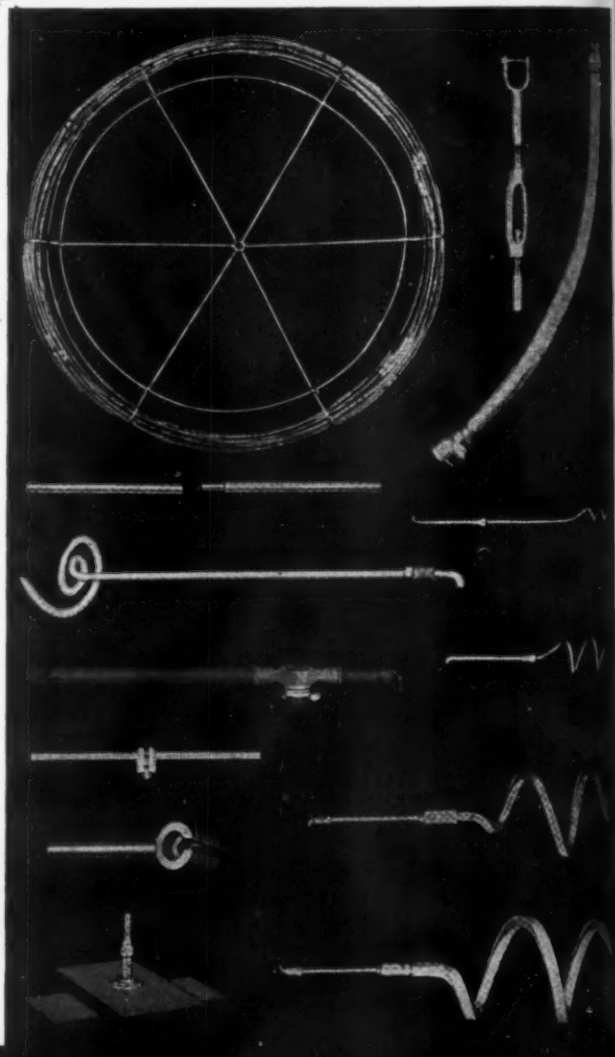
STANDARD CITY SET

YOUR city can save time, money and labor in sewer cleaning operations with this Standard City Set of Flexible Sewer-Rod Equipment. With these tools a few men can clean more underground pipe than an entire crew can with old, outmoded methods. Flexibles eliminate the time-consuming, hot, unsanitary part of the work.

Send for illustrated catalog showing the complete line and the modern methods used by 75% of the cities in the United States.



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Standard gate valves can be inserted in any line up to 48" in size, without interrupting the flow or even reducing the pressure. The procedure is simple, fast and economical. The nuisance of shutting down the line and the expense of dewatering is entirely eliminated.

SMITH Valve Inserting Machines can be purchased or rented. Write for information.

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GATE VALVES
CHECK VALVES
INSERTING VALVES
TAPPING SLEEVES AND VALVES
WATER SERVICE BRASS GOODS

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Your customers, too, have good horse sense about pure drinking water. They want water that is safe — properly chlorinated — and they won't tolerate dangerous undertreatment or the disagreeable taste resulting from wasteful overtreatment.

Over 17,000 installations of %Proportioneers% are providing dependable and precise chemical feeding in many parts of the world. %Proportioneers% equipment automatically injects just the right amount of treating chemical at just the right time. Models are available for constant rate, flow-responsive or time-responsive operation. We can solve your water treating problem.

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EDITORIAL OFFICE
155 East 44th Street, New York, N. Y.
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COMING!

"Operation of Activated Sludge Plants"

Frequently tries the soul of the operator and the plant manager. As an aid and practical guide to activated sludge plant operators, this article has been developed by a highly observant contributor of long experience in dealing with the process and studying its behavior under a variety of conditions. We are happy to be able to reproduce this highly valuable operating guide which was developed as a lecture delivered to the recent Pennsylvania Short Course for Sewage Works Operators, and written for small as well as large plant operators, by—

DR. GAIL P. EDWARDS, Chief Chemist,
Dept. of Public Works, New York City.

The "Autoxidation" Process

Constitutes a novel method of making ferrous or ferric sulphate from iron scrap and sulphur dioxide, produced by burning sulphur in a new and efficient type of sulphur burner. Where cheap ferrous sulphate (copperas) is available the more costly ferric sulphate may be economically produced therefrom, rather than starting with iron scrap. Furthermore, the process can be used to produce low cost sulphuric acid instead of iron salts. The iron salts so produced may be used in water, sewage or industrial waste treatment, or for sludge dewatering. At Phoenix, Arizona, the economically produced solution of iron salts is employed for odor control, the iron "fixing" the volatile sulphides as non-volatile ferrous sulphide. Coincidentally this same iron serves as a flocculation aid in the activated sludge process. The "Autoxidation" process has been perfected jointly by the authors—

HARMON E. KEYES, Cons. Chem. Engr., and
DARIO TRAVAINI, Supt. Sewage Treatment,
Phoenix, Ariz.

A Simplified Bacteriological Procedure

Upon recommendation of a well-known state sanitary engineer, who realized the need for a simple procedure for making bacteriological examinations of water which may be used by the smaller plant operators to the advantage of all concerned, we have secured a picturized description of such a procedure, which has been developed in the laboratories of the author—

DR. CHAS. A. HUNTER, Director of Labs.,
Kansas Dept. of Health, Topeka, Kan.

London's Water Supply in Peace and War

Is the story of the safeguarding of the purity of London's drinking water during the war and the blitz. It is the story of operations and carefully planned precautions, not previously disclosed for security reasons. It is the story of why, in spite of terrific damage to the water system, there was no outbreak of water-borne disease in five years of war. It is a story told by the man responsible for the control of water purity over London's vast system—

LT. COL. E. F. W. MACKENZIE, O.B.E., M.C., Ch.B., D.P.H., Director of Water Purification, London.

Chemical Treatment of Soapy Waste Waters

Offers an excellent means of handling wastes from laundries, scouring establishments, and synthetic rubber plants employing soap solutions. Experimental data on the application of calcium and magnesium salts to the treatment of such wastes have been obtained and reported by—

HARRY W. GEHM, Tech. Advisor,
Nat. Council for Stream Improvement.

"Sludge Pumping"

Is a discussion of the method of transfer of sludges by use of the automatic pneumatic ejector, operating on compressed air digestor gas or steam, as best suits the condition at hand. The article reviews the mechanical and economic advantages of this method of transfer of sewage solids, and discusses recent improvement in equipment and operating experiences with the method. The author, connected with the company which for years has manufactured pneumatic sewage and sludge ejectors, is—

CHAS. E. YEOMANS, President,
Yeomans Brothers Co., Chicago.

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LET IT DRIP!"

IT costs money to have a plumber repair leaking faucets and toilet bowls—so it's natural for consumers to ignore small leaks for which they pay nothing.

But when you install a system of regular meter inspection, test and repair, so that your meters will register at least 90% at ¼ gallon per minute, the average consumer will be glad to pay a plumber to fix the leaks, rather than pay higher water bills.

In this way, water waste is curbed; and in those cases where leaks are allowed to continue, additional revenue is obtained for water which otherwise would have gone unaccounted-for. Your experienced Trident representative will be glad to help you start a meter testing and repair program.

124

Trident Water Meters

EXperienced repair-men like the Trident meter because its simplicity makes it easier to repair. They are the best judges of meter values . . . ask them.

WATER WORKS & SEWERAGE

VOL. 92, No. 7 — *A Gillette Publication* — JULY, 1945

PROBLEMS OF A MUNICIPAL WATER WORKS LAND OWNER

With Particular Reference to Miscellaneous Land Uses

(The Second of Two Articles on Land Use and Management)

W. R. LaDUE*
Supt. and Chief Engineer
BUREAU OF WATER AND SEWERAGE
AKRON, OHIO

SO FAR this general topic has been developed around the main problem of reforestation on excess lands in the vicinity of Akron's three existing supply reservoirs, covering about 5,000 acres including about 2,200 acres covered by water. (See *Water Works & Sewerage* for June 1945.)

*Vice-President Am. Water Works Assn.

Obviously, there are other uses made of these lands, together with the other 8,000 acres which the Water Department controls in protecting its future water supply sources.

The rapid growth of the City in the early 1920's lead to the adoption of a farsighted policy for long-term development. This policy provided for future reservoirs in the upper reaches of the Cuyahoga River. Topographical surveys and maps were made of some 25,000 acres of land and preliminary engineering plans and estimates were made fixing the location for a future 12,000 acre reservoir. Progressively since 1919, without solicitation, strategically-located parcels of land totalling over 8,000 acres in this reservoir basin have been purchased outright with

"White-faces"

A portion of Akron Water Department's 300 pure-bred Herefords make a pretty sight and, a little later, also a "pretty dollar" for the Department.

Water Department funds. This policy was often opposed but nevertheless went forward so that now the City's rights, intents, and purposes are accepted as a well-thought-out and far-sighted project for preserving the City's vital water supply. The engineering wisdom of the plan was rather clearly demonstrated during the drought periods of 1935-1939 and 1943-1944, when many Ohio cities suffered for lack of water.

Watershed Development

The use of these lands after ownership and pending water supply development, aside from reforestation, is of interest here. The use and control of the watershed above Lake Rockwell—206.6 square miles—afforded opportunity for serious study. Please consider the differentiation between intake reservoirs and upstream reservoirs. Complete control of catchment areas may appeal to some to be idealistic, but in many New England cities such has been actually achieved through ownership. Desire for minimizing of pollution, reduction of water color and turbidity and erosion control are the driving factors. In this study, many items play an important part, such as the presence of lakes and ponds, farming operations, forestation or forest cover, and the spread and type of watershed population. In any event, it is well for any water utility to know *why* its watershed produces the particular type of raw water that it does. Bacterial, chemical and physical analyses are determined and the controlling causes are studied. The presence of pollution may dictate the necessity for evoking state laws for sanitary control over sewage disposal and stream pollution. A turbid stream may be indicative of faulty farming or the need for erosion control. Highly colored waters may direct attention to swamp drainage or the presence of deciduous forests. Any type of control calls for intelligent handling to secure public cooperation and close supervision of privately-owned areas to insure maximum results while retaining public respect. In the use of lands under our ownership and supervision, the following methods are employed.

Farming

Approximately 3,000 acres are leased on a year to year rental basis. Farms having farm buildings are leased for general farming to tenant farm families. Smaller areas are leased to supplement existing farms owned by others. A well-balanced farm contains buildings, garden plot, grazing areas, water supply, wood lot and tillable fields. Operation methods will insure

The Author

its usefulness or prove its detriment to the watershed. In operating its own farms the Akron Water Department endeavors to set an example for adjacent watershed area farms to follow and emulate.

City Farms

In the early part of the recent depression, jobs were provided for needy citizens by putting them to work on city-owned properties. Hundreds were transported to Water Department lands in Geauga County where they were employed in excess land improvement, principally in clearing and grubbing operations. As a result, about 2,000 acres of old farm lands were cleared of "slashings," underbrush, and scrub growth. Fences were rebuilt and buildings repaired. About $250,000 was expended in this work. If left alone, in 20 years all the areas would have deteriorated again to a useless waste. To protect the investment, a decision was made which eventually placed the Akron Water Department in the farming and grazing business. This action involved the purchase of 300 head of Hereford cows from Western ranges for the purpose of raising beef cattle, and 1,000 sheep from southeastern Ohio farms. Motorized farming equipment was brought in, together with several horse-drawn implements, and a reliable trained farm overseer was hired to direct a force of ten farmers. All personnel was placed in farm houses at "token" rental on individual farms on or near the cleared areas. Each man was allowed his own cow, chickens and a garden plot and supplementing his pay, he was given cow and chicken feed, potatoes and firewood in fixed amounts. His pay and tenure of office were fixed by Civil Service regulations. His duties included general farming, building maintenance and stock raising.

Farming Methods

In order to reach the virgin soil, the pioneer man had removed native forests and plowed under the grass sod to prepare areas suitable for producing crops. If plowing was on steep slopes, each rain washed large quantities of loose soil into the streams. Such soil erosion can be minimized by so-called scientific "contour farming" and the rotation of crops and cover are also effective. We have used both methods in the production of such crops as potatoes, soy beans, clover and timothy hay, corn, ensilage, barley, oats and wheat. Since several hundred acres are involved, up-to-date motorized equipment and methods are employed. In this the State Department of Agriculture has been contacted with gratifying results. Our aim is to make the farm operations self-sustaining and self-supporting and in this we have succeeded. Sufficient crops are raised to carry the stock through the winter, using existing barns on the purchased farms. Surplus cattle, sheep, grains and crops are sold to maintain fixed inventories for carry-over from fall to spring.

Sheep

Geauga County, in the old days, was a sheep raising district, with its hilly grasslands and small streams. The sheep population was as high as 60,000. Before the depression, this number dwindled to a few thousand and now it has risen to about 6,000, principally, we believe, through our showing the way. We selected our breed for hardiness,

Maple-Sugaring

Sledding in the freshly caught sap going into collection tanks.

A section of a "sugar bush" with sap buckets in place to catch the spring crop.

Sap evaporator on East Branch turns out 300 to 650 gals. of syrup each year.

utility and wool bearing. Our real purpose was to keep the land cleared and to maintain grasslands, meanwhile deriving some revenue to offset expense. For these reasons, we selected the Delaine-Merino, a hardy, fine-wool sheep, requiring minimum of care. Lambing time is late April, shearing time early May and sale time in late October. On the average, about 6,000 lbs. of wool are clipped by expert shearers hired from the sheep country of southeastern Ohio. A ready market is secured through a cooperative association at Columbus. In the fall, the flock is "culled" and all old and defective animals are removed. Replacements are selected from the annual increase in order to maintain the flock at a predetermined level of about 800 head. All "culls" and surplus are sold to local butchers or stock yards. Sheep require considerable care only at times. Wet weather and swampy lowlands produce foot rot necessitating foot treatment with "blue stone" (copper sulphate) and actual trimming of the hoof. Sprays and dips are used to cut down the fly and tick nuisance. A dipping trough is an essential part of any sheep ranch. Worming by capsules is practiced twice each year. Lambing time requires some close attention particularly where fox predators are present. During the war period, due to labor scarcity, we have found a very practical use for sheep—as lawn mowers. Since our dams are fenced in, we place small flocks of sheep in the enclosures to keep down the growth of grass and weeds on the embankments and surrounding area. This practice is also followed in the City around our equalizing reservoir, with much education, delight and interest to city children.

Cattle

Geauga County's rolling grasslands and abundant spring-fed streams and its proximity to large cities, have served to make it a beef cattle and dairy district. For obvious labor reasons we passed up the dairy business and selected the Domino strain of the Hereford breed of cattle, noted for its beef qualities, its hardiness and sturdiness. We maintain our own breeding bulls. We handle the animals entirely as "range cattle" and in mild winters they forage all season. We, of course, utilize existing barns for winter feeding. Calving time is in May and June and the calves do a good job of tending to the milking. The Hereford is a hardy, resourceful animal requiring little care. Of course, the herd is watched in calving time and major ailments ofttimes require the services of a veterinary. Tuberculosis and Bang's Disease tests are made as required by public authorities so that the herd is maintained free from such complications. "Culling" is conducted in late October, similar to that described above for sheep, and the herd reduced and maintained at about 300 head. "Culled" and surplus animals are disposed of in nearby cities or at the farm. Since we maintain a good strain, we have little difficulty in disposing of surplus calves for breeders and feeders.

Lumbering

Over this section of our watershed there grew originally forests consisting principally of chestnut, beech, maple, ash and elm. Large areas have been cleared but on many of the areas we have purchased, there remains considerable marketable timber. Eventually, below the future reservoir flow line, large areas of woods will be removed. Above such water line, however, woods will prove a valuable asset. Our plan calls for reforestation of the latter areas. We have had many offers to sell timber which we have declined. Our policy is to remove timber in all areas only after careful selection, inspection and marking. Logging is done in the winter when the logs can be easily sledded out to the roads. Local sawmills cut the logs to order in sizes suitable for the Water Department's needs in pipe laying and other construction. This practice alone has saved the department thousands of dollars and our woods have been benefited by removal of trees which have completed their useful life span.

Delaine-Marinos

The spring clip yields on the average 6,000 lbs. of fine wool yearly. Below is a bunch from the 800-head herd maintained. On the right is the annual sheep dip in operation.

Maple Sugar Bush

Geauga County is the center of the maple industry in northeastern Ohio. As a part of our farm activities, we operate two large sugar camps with 3,000 buckets; capable of hanging in excess of 2,000 more buckets when conditions will allow. Each "bush" has its evaporator house and standard equipment. After the war it is our intent to operate these two bushes to capacity and to develop at least two others of like possibilities. Sugaring time is in February and March, depending upon the weather, at a time when other farm duties are not too heavy. Fire wood for the evaporators is available from our logging operations and from woods cleaned up during the winter months. A ready sale for the syrup, sold only in gallon containers, has always been found in Akron at ceiling prices, and the demand always exceeds the supply. The crop has varied from 300 to 650 gallons per year.

Tenant Farming

Farms too widely scattered for our own use are rented to farmers owning adjacent lands, or if there are buildings available, to resident farmers. To obviate advertising, rental is on a year to year basis. Standard agreements prevail covering such items as tenure, care of buildings, use of land, non-conversion of sodded areas into plow land, cultivating, fertilizing, crop rotation, use of wood lots and fencing. In general, a cash rent is stipulated, although recently, due to loss of farm manpower through draft, we have arranged for considerable share-cropping on plow lands. Our farm overseer collects all rents, with agreements handled at the main business office of the Water Department.

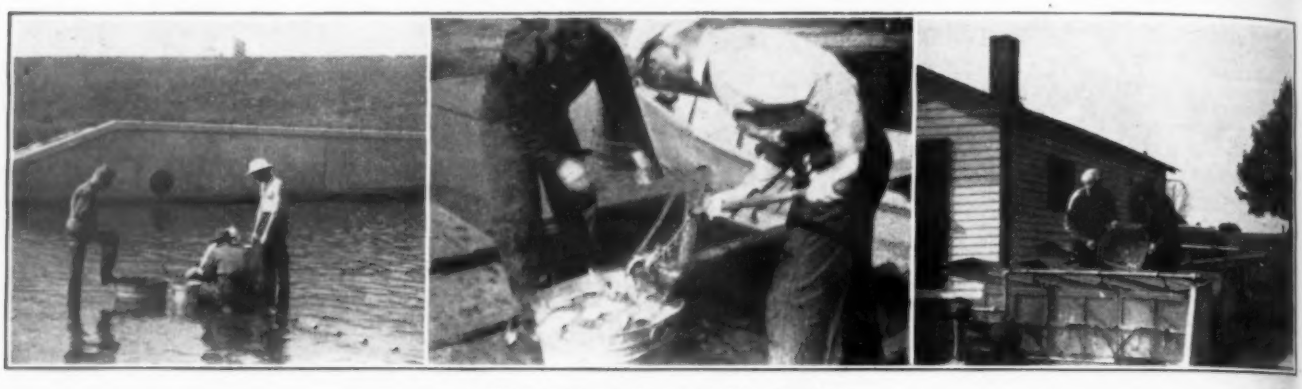
Trapping

The earthen dams and dikes which form reservoirs must be protected from the water animals, particularly muskrats. For this reason we believe trapping to be an essential activity to be carried out either by reservoir patrolmen or by holders of leased trapping rights. We employ the latter method, believing that the trapper-lessee, to protect his own investment, will keep down the poaching which inevitably happens. As a potential patrolman, the trapper gives more than appears in his nominal rental fee. We have leased trapping rights both on the share basis and for cash. We prefer the latter. Bids are received each fall for certain fixed trapping areas. Most trappers in this section of the country are pursuing a hobby; they trap because they enjoy it. Contracts specify rental fees, describe the area covered, limit the time, refer to state trapping laws and provide for cancellation. The catch is generally restricted to animals whose natural habitat is water, consequently muskrat and mink comprise the principal catch. In certain areas fox trapping and hunting is allowed.

Hunting

Ten years ago, before the construction of our East Branch Reservoir, we became a part of a controlled hunting plan whereby numerous owners of contiguous farms banded together to allow and control hunting. The plan was to provide a centrally located station where permits were issued to hunt on specified and segregated farms. In this way, a hunter or hunters were assured of non-interference for the day. The fee was 50c per person per day. At the end of the hunting season the total fees were divided among several farm owners in the plan in proportion to acreage. The plan has proved so popular that we have used it in controlling hunting on all of our farms in Geauga County. During the hunting season, usually from November 15 to January 1, we hire special deputies, both for patrol and to carry out the directed activities. In renting property for farming, we reserve all hunting rights. Certain areas have been restricted as to hunting and are used as sanctuary and for propagation.

As above mentioned, our sole purpose in keeping stock and in farming is to maintain our cleared areas so that they will remain cleared, the investment and expense of the original clearing being protected in this way. With the sale of sheep, wool, cattle, grain and maple syrup, the rentals of surplus farms, hunting and trapping privileges and the use of lumber, we have a sufficient actual and potential revenue to produce a self-sustaining operation. We must not forget the potential benefit expressed in terms of cleared land maintenance. Real estate taxes are paid on all farm properties at full rates, the only lands at present exempt are those under water.



Fish Propagation and Distribution

Seining fish from race below East Branch Dam for lake stocking.

Transferring stocking size fish from sorting float at Lake Rockwell.

Loading fish into truck tanks for distribution to various reservoirs.

(These operations give joy to 8,000 fishermen who take a 60,000 catch each year from Akron's fishing lakes removed from the water supply intake areas.)

The State's Fish Distribution Truck

Loaded and ready to transplant fish harvested from Akron's fish propagation water supply lakes.

Fish Conservation

Twenty years ago public fishing was allowed in and around Lake Rockwell, at that time the City's only reservoir. By far the large majority of the public respected the privilege but the commission of nuisances by a thoughtless minority resulted in public and departmental resentment and in placing of bans on fishing in any waters in direct connection with the public drinking water supply. To offset, in a measure, the loss of fishing privileges, an agreement was entered into with the Division of Conservation of the State of Ohio, covering the propagation and the removal by seining of fish from Lake Rockwell. The essential parts of the agreement are as follows:

"Whereas, The City of Akron has constructed a dam across the Cuyahoga River Valley near Kent in Portage County, Ohio, thereby impounding the waters of said river into a reservoir, known as Lake Rockwell, the source of the City of Akron's water supply and adjacent thereto, Lake Pippin, consisting of a total of about seven hundred seventy (770) acres of water area and

Whereas, the City of Akron owns the entire real estate at the shore line thereof, and

Whereas, the parties hereto, for their mutual benefit, desire to make an arrangement for the removal and distribution of fish from said reservoir by the Division of Conservation of the State of Ohio.

Now therefore, it is hereby mutually agreed between the parties hereto

That the City of Akron shall permit the Division of Conservation of the State of Ohio to use a sufficient portion of its real property, being that part now occupied by said division with its buildings and equipment and such portions as may be necessary for the removal of fish from said reservoir.

Provided, however, that the fish harvested from said reservoir known as Lake Rockwell and Lake Pippin by the Division of Conservation of the State of Ohio shall be distributed to the public, that is, waters open to the public for fishing purposes and that said distribution of fish harvested shall be as follows:

Seventy per cent (70%) to waters within Summit County, Ohio, including the Mogadore Reservoir in Portage County, and the East Branch Reservoir in Geauga County, both owned by the City of Akron, Ohio; and thirty per cent (30%) to waters within the State of Ohio outside of Summit County, Ohio.

And provided further, that no waters shall be entitled to receive fish unless they abide by and observe the rules and regulations promulgated by the State Department of Conservation.

It is further agreed that the distribution of said fish amongst the waters of Summit County, Ohio, shall be subject to the approval of the City of Akron acting through its Mayor-Manager.

This contract shall continue in force so long as the terms thereof shall be performed by the respective parties; subject, however, to the right of either of the parties hereto to terminate the same upon giving notice of his intention so to do to the other party six (6) months in advance of such termination."

This particular agreement has been in force since 1942, following similar agreements commencing about 1927. The terms are simple, but, with mutual respect of both parties for mutual benefits, they have proven both satisfactory and effective. Removal operations, originally carried out in the spring, have been shifted to the fall of the year. Since only mature fish are removed, it was felt that fall removal and placement allowed the fish to accommodate themselves to new waters well in advance of the spring spawning season. Conservation officers have been particularly effective in enforcing the game and fishing laws and in the restricting of unlawful trespass. Since all the fish go to public waters, public reaction, exemplified through numerous fish and game associations, has been one of approval.

This reaction was quite evident while we were preparing to open the Mogadore Reservoir for public fishing in the summer of 1943 as indicated by the following. This reservoir, covering 1,000 acres, was first filled in the spring of 1939. In the fall of 1938 about 8,000 mature fish, —bluegills, black bass and crappies, — had been released from Lake Rockwell. In the fall of 1939, 1940, 1941 and 1942, equal or greater quantities were planted. A fish count in the summer of 1942, carried out by the State Division of Conservation indicated a fish population which could well stand public fishing in 1943. Anticipating such a move, the presidents of all

On One of Akron's Breeding Farms

Pure bred Hereford cows produce calves for keeping up the 300 steer herd. Inasmuch as any mixing of milk and water constitutes "dangerous business" the calves are allowed to take care of the milking operation, doing so in a thoroughly efficient manner.

Haying Time Is a Busy Time

fish and game associations, the press and conservation officers were invited to sit with Water Department and City officials as an Advisory Council to suggest rules and regulations for the operation of public fishing at the Mogadore Reservoir. As a result of these meetings, the following rules were placed in effect.

"1. Each fisherman must register at the boat rental office immediately upon entering the property. The person thus registering is granted permission to enter only upon the unrestricted area of Mogadore Reservoir as shown on the map mounted at the Boat House.

2. Only boats owned by the Bureau of Water and Sewerage shall be operated on the waters of Mogadore Reservoir.

3. Ingress and egress to and from the reservoir area shall be only at entrances provided by the Bureau.

4. No boats shall be operated in areas now or hereafter established where boating is prohibited.

5. The use of motors will not be permitted on any of the boats.

6. The use of the boats on the waters of the reservoir shall be at the risk of the users of the boat. The Bureau of Water and Sewerage and the City of Akron and their agents shall not be liable for damages or accidents of any kind to the users of the boats resulting from the use of the reservoir for boating.

7. Parties using the reservoir for boating shall do no act or thing to cause unsanitary conditions or destruction of property on any of the lands or waters of Mogadore Reservoir and shall do nothing to cause pollution of the reservoir waters. They shall not throw burning matches, smoking cigarettes, or other smoking materials, hot ashes, or any inflammable material about in a manner to cause starting of forest or ground fires. They shall not start any bonfires or other fires except in ovens or stoves provided for that purpose.

8. In order to serve the greatest number of boatmen, each day shall be divided into two periods:

"A"—Period—5:30 A.M. (or later) to 1:30 P.M.

"B"—Period—1:30 P.M. to 9:30 P.M. (or earlier).

The rental rates for row boats for one period or fraction thereof shall be as follows:

Week Days	$0.75
Sundays & Holidays	1.00

Lost or damaged equipment shall be charged for as posted. A party may not rent a boat for more than one period per day unless there are boats remaining after the waiting list has been cared for.

9. Each boat shall be limited to three occupants.

10. The above regulations shall not apply to boats when operated by authorized agents of the Bureau of Water and Sewerage or the Ohio Division of Conservation and Natural Resources.

11. Fishing from boats shall be done only in those areas now or hereafter designated as fishing areas.

12. Shore fishing shall be done only along those shores so designated for that purpose.

13. The use of intoxicating liquors on the premises will not be permitted. Any person under the influence of liquor will not be permitted to enter the premises and if found on the premises will be subject to eviction."

Since the waters of this reservoir are used by war industry, it has been deemed unwise to permit trespassing in and around the dam and dike areas, therefore, during the war, only about 350 acres are opened for a period of 90 days each year from about July 1st to October 1st. The balance of the year the entire area remains closed to all public trespassing. An order of the State Division of Conservation, supporting and designating open and closed areas established by the City, was secured as follows:

"FISH SANCTUARIES IN MOGADORE RESERVOIR, PORTAGE COUNTY

WHEREAS, the Conservation and Natural Resources Commission of Ohio, after a thorough investigation and a public hearing, has determined that it is expedient and to the best interests of the citizens of Ohio that the following regulations in Modagore Reservoir, Portage County, to provide permanent fish sanctuaries for the propagation of fish, be made and established, effective from March 1, 1945 to February 28, 1946, both dates inclusive;

THEREFORE, the Conservation and Natural Resources Commission, under authority of Section 1438-1 of the General Code of Ohio, hereby orders that from March 1, 1945 to February 28, 1946, both dates inclusive, the following regulations be and the same are hereby established:

(1) It shall be unlawful for any person, at any time, from March 1, 1945 to February 28, 1946, both dates inclusive, to take fish from any fish sanctuary established below, when the boundary of such propagation area is posted with state signs indicating fishing is prohibited. These established propagation water areas are:

MOGADORE RESERVOIR IN PORTAGE COUNTY

(a) All of that portion of Mogadore Reservoir lying east of a line parallel to and 100 feet west of the center line of Porter Road.

(b) The entire western part of said reservoir, northerly, westerly and southwesterly of a line of buoys across said reservoir, and approximately 3,000 feet northwesterly of where State Route No. 43 crosses the main reservoir.

(c) That portion of Mogadore Reservoir lying between lines parallel to the center line of State Route 43 and 100 feet distant easterly therefrom and 100 feet distant westerly therefrom said center line.

Signed, sealed and ordered published this 19th day of January, 1945."

Twenty-four hour patrol is practiced. As indicated no privately owned boats are allowed and use of motors is prohibited. The Water Department has provided 35 excellent fishing boats for hire and maintains a patrol boat with outboard motor for emergencies. In 1944 about 8,000 persons availed themselves of fishing privileges securing a catch estimated at 60,000. Sanitary toilet facilities, approved drinking water and ample parking space are provided. By the construction of a contemplated check dam, about 250 acres of shallow water in the upper reaches of the reservoir can be maintained at practically constant level. This area has been declared a fish and game sanctuary and has been set aside for propagation purposes. Excellent public relations have prevailed as evidenced by both the interest of the Advisory Council and the use of the facilities by the public.

Although completed about the same time, the East Branch Reservoir has not yet been opened for public use, principally due to lack of manpower and facilities necessary for its successful operation. Stocking proceeds and fish counts indicate that the fish population is increasing both in number and size. It is anticipated that regulations, similar to those at Mogadore, will prevail when this area is eventually opened after the war.

Postwar

It is submitted that 13,000 acres of lands and water offer many interesting problems and latent opportunities for postwar activities. It is not anticipated that Lake Rockwell, being directly connected to our domestic water treatment plant, will ever again be opened for public use. Control of its shore areas through reforestation and other present activities will continue.

East Branch Reservoir, being over 50 miles from Akron, will not receive the heavy traffic expected at Mogadore. Reaction after a trial opening will dictate policy as to future public use. Reforestation and game propagation will continue as a matter of department policy until all areas are covered.

Acquisition of land will continue in the basin of the projected larger reservoir between Lake Rockwell and East Branch. Controlled farming and grazing will continue, keeping always in mind the ultimate reservoir purpose of areas below the proposed flow line and the importance of a covered shore area. Reforestation of numerous areas permanently above flow line are planned when manpower becomes available. To that end nurseries are now planted and will continue to be considered a necessary operation. Our present nurseries, without indicating species, hold the following:

East Branch	65,000
Lake Rockwell	11,000
Mogadore	137,000

It is even probable that the post-war period will indicate the need for the construction of the large reservoir—a $6,000,000 project involving millions of man-hours of labor in providing dams and dikes, road relocations, bridges, highways, shore line roads, reforestation and excess land improvements.

At Mogadore Reservoir, much more extensive public use is anticipated. Its construction purpose was three-fold: (1) flood control; (2) public recreation; (3) industrial water supply. In all three it has already been called upon to serve. Purpose number two will change with removal of the restrictions of war. Plans have been under consideration for several years anticipating such uses as: recreation areas, playgrounds, lookouts, scenic drives, boating, hiking, nature trails, bridal paths, wild life conservation, winter sports; in short, such uses as are generally associated with so-called Metropolitan Parks. Many acres yet remain requiring reforestation and shore line treatment. It is dubious that bathing would prove successful since a fairly constant water level cannot be assured, bearing in mind the more essential use of industrial water supply.

Akron's position may be unique, not particularly in the fact that it is a land-owner with 13,000 acres to control, but from the point of evolution of those holdings. Methods of acquisition; conditions at the time of purchase; the long-term plan to protect a water supply; perhaps Akron's position astride the Continental Divide,—all contribute to what we believe are interesting problems in water supply. The future—Post-war—presents problems no less intriguing. Almost of a surety they will be more intriguing. In consequence, we are planning, checklisting and forecasting. We recommend to any water utility landowner, of large acreage or small, that he study and plan carefully for a long-term use of his acreage. His ideas will most assuredly bear fruit POST-WAR and forever after.

Goit and Garman Named Los Angeles Utility Heads

Grant Becomes Ass't Chief Water Engr.

On the recommendation of Samuel B. Morris, General Manager and Chief Engineer, of the Los Angeles Department of Water and Power, Laurance

Laurance Goit

Burton Grant

E. Goit has been named Chief Engineer of Water Works, and Charles P. Garman, Chief Electrical Engineer. Both men will act as Deputy General Managers.

Mr. Goit succeeds to the vacancy left by the retirement of William W. Hurlburt. A graduate of Lewis Institute of Chicago, Mr. Goit has been with the department since 1924, starting as a draftsman, and has been asst. chief engineer since Nov. 1943. Goit is a member of ASCE and AWWA. Burton S. Grant, formerly engineer of the Los Angeles Aqueduct Division becomes Asst. Chief Engineer of Water Works.

John Rice Appointed to Pa. Prof. Engineers Board

John M. Rice, Consulting Engineer of Pittsburgh, Pa., has been appointed a member of the Board for Registration of Professional Engineers in Pennsylvania.

Pennsylvania Sewage Operators' School Marked Success

Pennsylvanians were not to be outdone by the fact that meetings and conferences have been ruled out by Washington authorities.

In consequence, a lecture-laboratory course on Sewage Treatment and Disposal was held at St. Joseph's College in Philadelphia on seven consecutive Wednesdays, from April 11, to May 23, 1945. The course was sponsored by the United States Office of Education through the Engineering, Science and Management War Training Program. The program for the course was developed with the cooperation of the Pennsylvania Department of Health; the Penna. Sewage Works Assn. and the Sewage Works Operators' Assn. of Southeastern Penna.

At each of the seven sessions the attendance ranged between 95 and 100, with a remarkable attendance record of 99.6% for the entire course.

Francis S. Friel, Philadelphia consulting engineer, and National Federation Director for the Pa. Sewage Works Ass'n, assumed Chairmanship of the course, and its success can be attributed in no small degree to his close and enthusiastic personal attention to the project, and to a hard working committee. Rev. Joseph J. Malloy, Prof. of Chemistry at St. Joseph's, served as "Dean of the Faculty" for the course.

At the closing exercises 64 certificates were presented to those satisfactorily completing the course. An enthusiastic vote was cast for a repetition of the school in 1946.

AWWA ACTIONS

Executive Committee Inducts New Officers and Handles the Business of the Board

ON June 29 in New York City the Executive Committee of the Am. Water Works Assn. was called together by Secretary Jordan for a full day's meeting, to attend to certain business of the Association and to act for the Board of Directors in matters which customarily are handled by the Board during the annual convention of the Association.

In three aspects there was some similarity between the Executive Committee Meeting and an AWWA Convention. Foremost, there was the temperature—and plenty of it—which caused the Committee to suggest to the Secretary earlier Spring dates for the next convention if held in St. Louis. This question is to be taken up with St. Louis hotels and others primarily interested. Then, there was the retirement of the old president, Sam Newkirk, Jr., and turning over of the gavel of office to the new president, Leonard Thompson of St. Paul, Minn., and the induction of the new vice-president, Wendell LaDue of Akron, Ohio. (Incidentally these dignitaries were the only two in attendance who had to travel any considerable distance, or who required hotel accommodations).

Then there was the presentation of the memento of office to the retiring president—a handsome desk pen set in green onyx, with a mounted clock. Sam Newkirk said that he felt that he had earned it, but that the work had been, none the less, an enjoyable experience.

The third aspect resembling a convention was the luncheon arranged for all nearby members of the Board—this luncheon being given to the two new Honorary Members, resident in the New York area, who were selected for this honor by the Board in January. Sam Newkirk as his final duty as president made the presentation of the certificates and citations to George W. Booth and Col. Willard Chevalier. (The third Honorary Member of 1945 is Prof. R. W. Angus of Toronto, who received his certificate during the meeting of his own Canadian Section.)

Three Important Actions of the Committee

The three most important actions taken by the Executive Committee were—

(1) A decision to establish and implement a strong "Committee on Public Relations in the Water Supply Industry."

(2) Voted affiliation of the Association as a member of the U.S. Chamber of Commerce.

(3) Except for certain sections establishing permanent Federal grants for construction of sewage or waste treatment plants, voted endorsement and support of the Spence Bill (H.R. 592) and its counterpart in the Senate, the Barkley Bill (S 1037)—both bills intended to bring about a nation-wide program of securing and maintaining cleaner streams through procedure and operations to be established within the U.S. Public Health Service.

In addition, the Committee voted a continuance of AWWA's participation in the work of the "Joint Committee on Water and Sewage Works Development" which has frequently been referred to as the "Blueprint Now!" Committee for Post-War Betterment.

The Committee also formally voted the recent abrogation of all WPB restrictions upon AWWA's Standard Specifications for (1) Fire Hydrants, (2) Valves, (3) Steel Pipe, (4) Water Meters, (5) Sulfate of Alumina (Filter Alum), all of which have been set aside for the period of scarcity of metals that threatened the war effort. (In commenting on specifications for filter-alum the Committee called attention to the need for a revised specification for filter-alum in view of wartime experiences. Evidence had pointed to the general acceptability of a filter-alum with insolubles (possibly iron content also) considerably greater than existing AWWA specifications. It was pointed out that in several instances the higher insolubles had proved an advantage—seldom a disadvantage. On these grounds the Executive Committee feels that revision of AWWA Specs. for Sulfate of Alumina should be undertaken promptly. Further, that specifications for iron coagulants be also developed at the earliest opportunity.

A Public Relations Program

Guided by statements mailed in by Board Members, expressing their views and suggestions in respect to the proposed program by the Association looking toward publicizing the Water Works Industry and the work of those engaged therein over the nation, the Executive Committee voted the immediate establishment of a "Committee on Public Relations of the Water Supply Industry," to be composed of at least one representative from each Section of AWWA. This Committee is to serve as a survey group with the assignment of considering, studying and evaluating methods which can be most effectively and properly used to promote the public's better understanding of water supply as a service, as well as to increase the appreciation of the value of the services rendered by those that are employed in the water supply industry. The Committee in effect is a policy planning group. Its creation evidences the opinion of the Association's officers and directors that water supply executives and the industry as a whole, have been too well satisfied with letting their good works speak for themselves, and have *not* been sufficiently interested in receiving public credit and taking action in the direction of promoting

Retiring Pres.
S. F. Newkirk
Engr. and Supt.
Elizabeth, N. J.

New Pres.
L. N. Thompson
Engr. & Gen. Mgr.
St. Paul, Minn.

New Vice-Pres.
W. R. La Due
Chf. Engr. & Supt.
Akron, Ohio

Hon. Member
Geo. W. Booth
Chief Engr.
Fire Underwriters

Hon. Member
Col. W. Chevalier
Vice-Pres.
McGraw-Hill Co.

publicity of any nature. There is an axiom to the effect that a bit of advertising has never been known to hurt anybody's business, and has helped many. The Association plans now to work in this direction, after making carefully studied plans and developing a procedure which will be based on conservative endeavor until adequately tested and proven.

President Leonard Thompson has been successful in securing E. L. Filby of Kansas City, to assume vigorous chairmanship of this very important steering and planning group, which is being carefully picked to represent the various Sections equitably and proficiently. The Committee will be expected to present its plan of recommended action to the AWWA Board at its January, 1946, meeting. At that time the Board will authorize such programs as it desires, set up such staff operations and budget as appears to be indicated, and probably will simultaneously establish a smaller permanent Public Relations Committee to rank with the Association's Committee on Water Works Practice, and henceforth carry on in the interests of AWWA and its members in directions which can not be categoried as "technical only." This move denotes a decided broadening out of AWWA enterprise in the interests of its members—a commended broadening out.

New AWWA-Board Members

Albert R. Davis
Supt.
Austin, Tex.

Wm. B. Gibson
Supt.
Fort Meyers, Fla.

R. F. Goudey
San. Engr.
Los Angeles, Calif.

Herbert S. Grove
Supt.
Stillwater, Minn.

Harvey P. Jones
Cons. Engr.
Toledo, Ohio

Carl J. Lauter
Chemist
Washington, D. C.

J. J. Woltmann
Cons. Engr.
Bloomington, Ill.

U. S. Chamber Membership

After reviewing the series of comments which had been directed to the Executive Committee by members of the Board in response to the direct question—"Should AWWA become a member of the U.S. Chamber of Commerce?"—it was noted that the Director's opinion was strongly in favor of AWWA joining as an "Association Member." The Executive Committee viewed the move as perhaps the initial step in the proposed Public Relations effort, and unanimously voted the establishment of the affiliation.

The consensus of opinions of the Board, and AWWA officers can be expressed as follows. Water Works executives and local Chambers of Commerce work together to advance their particular communities. Public water supply service is essential to any community advancement. The U.S. Chamber of Commerce is to local Chambers what AWWA is, or tries to be, to the water supply industry of the nation—both give national leadership. Cooperation at the local level should be promoted by cooperation at the national level. On the other hand AWWA as an *Association Member* is not stepping into a position where it cannot retain its complete freedom of attitude and policy with relation to economic and social questions upon which the U. S. Chamber takes a recorded position, accepting only such of these viewpoints as AWWA sees fit. This stand of AWWA in its affiliation as an *Association Member* is accepted by the U. S. Chamber of Commerce and the understanding is complete.

The Spence and Barkley Bills

Abel Wolman, Chairman of AWWA's Committee on National Water Policy, reviewed the previously referred to Spence and Barkley anti-pollution bills (H.R.-592 and S-1037) for the benefit of the Executive Committee. Upon his recommendation of these bills, as the best of several which have been drawn up for hearings, the Committee voted endorsement of these bills with the exception of Sections 5, 6 and 7. These sections would establish Federal grants-in-aid to political subdivisions and also to *persons or industrial establishments* for the purpose of constructing sewage or industrial waste treatment plants. In endorsing these bills AWWA, does, however, endorse the assignment of certain responsibilities and duties with relation to stream pollution abatement and control to the Sanitary Eng. Div. of the U.S. Public Health Service. AWWA especially endorses those portions of these bills which call for USPHS investigations and studies of pollution abatement and waste treatment in cooperation with those states requesting such, and also endorse the publication of findings from technical studies and of reports and recommendations growing out of such USPHS investigations.

Committee Appointments

President Thompson has named the following committees and committee chairmen for the year—

The Executive Committee
S. F. Newkirk,Jr. L. H. Enslow
W. W. Brush W. J. Orchard
L. N. Thompson, Chairman

General Policy Comm.
L. N. Thompson L. R. Hanson
S. B. Morris W. J. Orchard
Abel Wolman Clinton Inglee
S. F. Newkirk, Chairman

Convention Management Comm.
T. J. Skinker L. H. Enslow
W. V. Weir H. E. Jordan
Clint. Inglee E. M. Jones
C. A. McGinnis A. T. Clark
L. N. Thompson, President
W. J. Orchard, Chairman

Water Works Practice Comm.
Malcolm Pirnie, Chairman
Reeves Newsom, Vice-Chairman

Publication and Program Comm.
L. H. Enslow, Chairman

Constitution and By-Laws
R. L. Dobbyn, Chairman

Finance Committee
W. W. Brush, Chairman

Comm. on Wartime Activities
L. R. Howson, Chairman

Comm. on Pensions and Retirement
Dale L. Maffitt, Chairman

Comm. on Water Works Organization
W. R. LaDue, Chairman

Comm. on National Water Policy
Abel Wolman, Chairman

FILTER SAND GRADING

With Respect to Grain Size and Uniformity

By J. TARRANT
Ruislip, England

THE writings of Allen Hazen on the grading of filter sand express his definition of fineness by the use of two terms: Effective Size and Uniformity Coefficient. The Effective Size is the size of a grain such that 10 per cent by weight of the material is smaller and 90 per cent larger than this size. The Uniformity Coefficient is the ratio of a size (than which 60 per cent is smaller) to the Effective Size.

The Hazen method has been well tried and is an accepted standard method of gauging the suitability of grading of sand. It gives a means of testing sand provided in a sample, but the application of the method for specifying actual size of minimum and maximum sieves to be used is not clear. That is to say, in using the Hazen method the sample is passed through a series of sieves, and, from a graph made by plotting the percentage of sand retained against each screen size, the Effective Size and the Uniformity Coefficient are determined according to the definitions given above.

What is not given, however, is the reverse operation, i.e., the description of the method of screening in order to produce sand which will conform to a desired standard of Effective Size and Uniformity Coefficient. Again, the naming of the Effective Size and Uniformity Coefficient does not appear to be a complete specification of the sand size, seeing that there is no limit placed on either the *fineness* of that 10 per cent which fixes the Effective Size, nor the *largeness* of the 40 per cent which is above the 60 per cent which determines the Uniformity Coefficient.

Thus for many who are concerned with the grading and choice of sands, the Hazen method may appear to be a long way removed from the practical sizing of sand by passing through sieves, so as to eliminate the unwanted fines and larger grains.

In *Water Works and Sewerage* of April and May, 1934, J. R. Baylis proposed a method of determining the grading of sand which was claimed to have advantages over the Hazen method. This provided a different basis for the fixing of the Effective Size and the Uniformity Coefficient, which, consequently, would have different values, for the same sand sample, from those obtained by the Hazen method. Here the Effective Size is that diameter obtained by multiplying the 1 per cent size by 1.5, and the Uniformity Coefficient is the percentage of material having a size less than the Effective Size. The difference in the two methods of obtaining Effective Size and Uniformity Coefficient are such that it is impossible to translate Hazen figures into those obtained by the Baylis system, and, like the Hazen method, the Baylis method does not fix maximum and minimum sizes of sand, seeing that any degree of fineness of sand may be included in the 1 per cent, and no limit of size is imposed in the upper direction. Baylis does recommend that the finest sieve should not pass more than 0.5 per cent of the weight of the sample. He claims that the Effective Size as found by this method is a true Effective Size and that it appears to govern the length of filter runs; that is, the length of filter run is proportional to the 2.15 power of the Effective Size.

The two possible methods of specifying sand are, (a) by stating the Effective Size and Uniformity Coefficient, and (b) by stipulating that it shall pass one size, and be retained by another size, of sieve aperture.

Combining the Two Methods

Possibly a combination of these methods may be employed. That is to say, the requirement that a sand must pass a certain screen and be retained on another defined screen may be stated, together with the desired Effective Size and Uniformity Coefficient, the latter requirement determining the proportion of large and small grains.

The purpose of this article is to tie in the two methods mentioned above: to link up screening with Effective Size and Uniformity Coefficient and to give a means whereby the large and small grains may be brought into line with the Uniformity Coefficient as may be specified.

Using the Hazen method, the chart here reproduced may assist in linking Effective Size and Uniformity Coefficient with screen sizes.

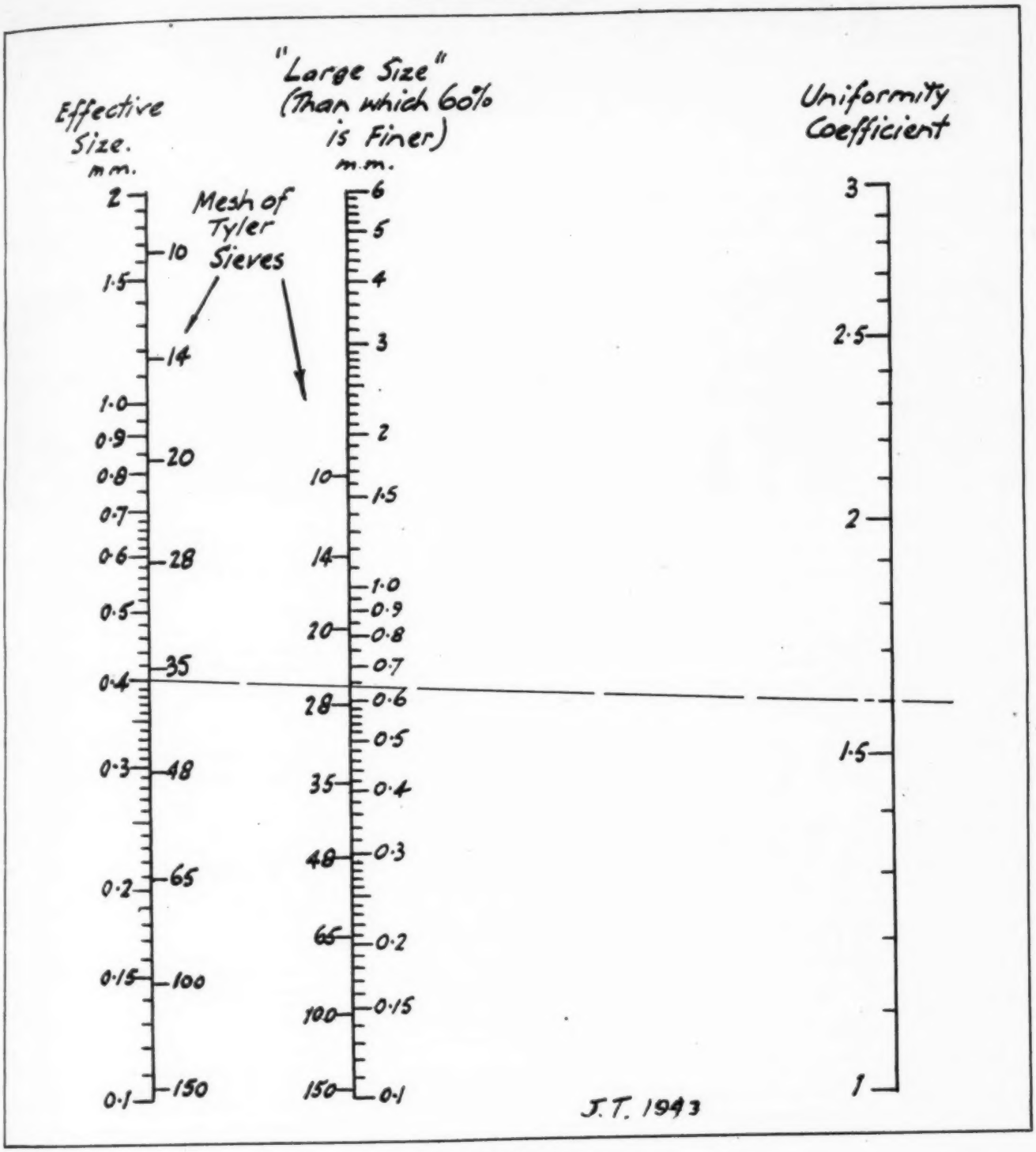
If a sand is to have an Effective Size=0.4 mm. and a Uniformity Coefficient=1.6, a line across the chart shows that the size of the large grains (than which 60 per cent is smaller) is 0.64 mm. The first-named is retained on a screen just smaller than Tyler's 35 mesh, and the large size on a screen lying between 20 mesh and 28 mesh. Where only certain sizes of screens are available it is possible, by pivoting the straightedge about the point on the scale which gives the Uniformity Coefficient, to find two values on the other scales which will work in, or if this does not quite meet the requirements, to hold the straightedge against one grain size and adjust slightly the Uniformity Coefficient within allowable limits and by so doing select the other grain size so as to use a desired, or available, screen.

Of course, other screen sizes may be added to both scales to adapt the chart to the user's own needs and facilities.

The two sizes (Effective Size and the 60 per cent size), being thus determined, it will be necessary to fix a smallest screen size by which the 10 per cent passing the Effective Size will be retained, and a largest screen size which will pass the whole of the sand.

Some indications of Effective Sizes and Uniformity Coefficients for slow sand and rapid filters are given in A.W.W.A. *Water Works Practice*. Examples there show that for slow sand filters Effective Size ranged from 0.23 to 0.37 and Uniformity Coefficient from 1.6 to 3.1. For rapid filters the figures were from 0.19 to 0.79 and from 1.37 to 2.2, respectively.

In a symposium on filter sands in *Engineering News Record* of May 7, 1931, it appeared that for rapid filters values of 0.4 to 0.5 mm. for Effective Size and 1.6 for Uniformity Coefficient were considered suitable. Opinions were there expressed that a fineness of not less than 0.2 mm. and a coarseness such that 90



Sand Grading Chart

per cent of the sand is finer than 0.8 mm. is desirable.

(References in the foregoing to Effective Size and Uniformity Coefficient are to the Hazen method.)

Practical Procedure

A practical procedure would appear to be:

(1) Decide Effective Size and Uniformity Coefficient.

(2) Using the chart, determine screen sizes, making adjustments, if necessary (as described above) to use standard or other available screens.

(3) Decide maximum and minimum grain sizes which will be allowed.

(4) Specify that 10 per cent is to pass the Effective Size and to be retained on the "minimum size." 60 per cent to pass the "large size." All to pass the "maximum size."

On this basis the supplier would screen sand so that,

(a) 10 per cent of the required quantity would pass the Effective Size and be retained on the "minimum size."

(b) 60 per cent would pass the "large size" and be retained on the Effective Size.

(c) 40 per cent would pass the "maximum size" and be retained on the "large size" screen.

The mixing together of (a), (b) and (c) gradings would give a sand which would comply with the specification for Effective Size, Uniformity Coefficient, and maximum and minimum grain sizes.

N.E.W.W.A. MEETING REPORT

By HARRY A. FABER*
Editorial Associate

THE May 17 meeting of the New England Water Works Association in Boston, the last monthly meeting of its current season, was especially well attended. In addition to the water works school and a joint session for the superintendents and chemists, the luncheon was followed by a technical program of exceptional interest.

The President
Karl R. Kennison
Chief Engr.
Metropolitan Distr. Water Comm.
Boston

Act'g Sec'y
Arthur L. Shaw
Partner
Metcalf & Eddy Engineers
Boston

"Water Works School: Pipe Flow Computations," by Prof. George E. Russell, Massachusetts Institute of Technology.

Professor Russell in illustrating pipe flow computations did a splendid job of showing how and why the most used equations for determining expected flow through pipes, velocity and loss of head. He developed the famed Chezy equation, which dates back to 1775 for the original and thereafter explained the modifications of this basic Chezy equation which have been developed since—notably the Williams and Hazen modification. He took the mystery out of the complicated looking Williams and Hazen equation with all of its tricky looking exponents which have been applied as a substitution for the square root sign in Chezy's equation—

$$V = C\sqrt{RS}$$

to produce the Williams and Hazen modification.

$$V = 1.318 \times C \times R^{.63} \times S^{.54}$$

in which R is the hydraulic radius (¼ the diameter of the pipe); S is the loss of head in ft. per 1000 ft. of pipe length; and C is the W-H coefficient which varies with the condition or roughness of the pipe interior. V is velocity in ft. per second. He explained that the C values published in voluminous "Hydraulic Tables" by Williams and Hazen (John Wiley & Sons, publisher) were derived from experimental data, myriads of computations, and many observations of hard loss through existing pipe lines of various diameters and age.

To further simplify the application of the W-H equation Prof. Russell described the Hazen and Williams Hydraulic Slide Rule and demonstrated the use of one of these rules which are now being offered gratis by the Cast Iron Pipe Research Ass'n of Chicago, and by the Lock-Joint Pipe Co. of Ampere, N. J.

In reply to a question Prof. Russell said that the W-H equation was no good for very rough pipes nor for any pipe of less than 4-inch diameter. However, he said, the working limits of the Hydraulic Rule would take care of the limitations.

"Aquatic Insects Common to Water Supplies," by Dr. Charles E. Renn, Associate Sanitary Biologist, Mass. Dept. of Public Health.

Dr. Renn illustrated his informal and amusing discussion by means of a micro-projector, using living organisms, and also by means of high-speed motion pictures. One of the organisms shown in action was the small crustacean, daphnia; in China but not in the United States this is host to a type of human tape-worm. The damsel fly nymph is an indicator organism, seldom being found in polluted water supplies. The hydra, rather frightening when tremendously enlarged, actually has stinging cells in its tentacles; often brownish slime accumulations are entirely composed of these organisms.

The motion pictures, photographed at the high speed of 900 to 3,000 frames per second, showed mosquito larvae feeding. They demonstrated important differences between the anopheles and culex types, the former feeds below the water surface and the later at the surface; thus, different control methods are required. Of outstanding interest was the turbine pump effect of hairs operating at high speed to convey food into the mouth of the larvae.

Programmers
Dr. Chas. E. Renn
Assoc. Biologist
Mass. Dept. Hlth
Boston

Jos. A. McCarthy
Chief
Exp't Station
Lawrence, Mass.

"Military Use of Public Water Supplies," by Lt. Col. Robert N. Clark, Sn. C., First Service Command, U. S. A., Boston, Mass.

Col. Clark defined the duties of the two Army branches concerned with water supply; the Engineer Corp. being charged with providing, developing or contracting for a water supply, and the Medical Dept. acting in a capacity similar to the State Health Departments to maintain inspection and regulatory services. Since problems differ, not only between foreign installations and those in the United States but between different parts of this country, there must be much flexibility in planning. Engineers of the Sanitary Corps are assigned to various areas, not to each station, and competent supervision can thus be provided through a district system. By direct supervision of installations, they specify treatment, interpret results, and make necessary decisions.

The purity of contracted for water must meet U. S. P. H. S. standards. The adequacy of routine chlorination has been a special problem. An order in the summer of 1942 specified that chlorination should provide 0.4 ppm. residual chlorine after 30 minutes contact at all army installations. The adverse reaction to this order was strong indeed; it was found that the many additional chlorinators re-

Class
Dave Moulton Portland Water Distr. Att'y, spellbound by the intricacies of $V = 1.318CR^{.63}S^{.54}$
Russell at the board explaining the mysterious exponents of the W & H equation.
Fred Reny (Portland, Me.), McDowell (Biddiford, Me.) working it all out after the lecture.

*Research chemist, The Chlorine Institute, Inc., New York, N. Y.

quired were not available, that certain officials considered it an insult to the quality of municipal water supplies, and that such treatment of some soft water supplies was especially unsatisfactory. This program was moderated to cover instances: where water characteristics made this amount of chlorine practically impossible; where large reservoirs or standpipes intervened; where municipal supplies of good sanitary quality were received; and where the chlorine residuals were adequate to show a good record of purity.

Col. Clark commented on the possibility that chlorination standards may require restatement. Perhaps greater distinction should be made between free available chlorine and combined chlorine, and in the case of waters having a high pH value. The OTA test (ortho-tolidine-arsenite) has been in limited use for one year and has given striking results in some supplies. It has been the practice of the army to give direct aid to municipalities requiring technical assistance in order to provide more satisfactory water supplies. The cooperation between army and municipal officials has been most satisfactory, and its result in the greater safety of supplies is very evident.

"Chlorine Dioxide Treatment of Water Supplies," by Joseph A. McCarthy, Chief of Laboratory, Lawrence Experiment Station, Mass. Dept. Public Health, Lawrence, Mass.

Mr. McCarthy reviewed the application of this new material for taste and odor control, commenting especially upon the success which has been attained when phenolic substances are the causative agent. These results have led to studies of the effectiveness of chlorine dioxide for treating waters containing woody or vegetable tastes or odors commonly found in New England.

Plant scale use of such treatment was started at the Chicopee, Mass., filtration plant in January, 1945.

When the relatively high dose of 5.0 pounds of sodium chlorite and 4.0 pounds of chlorine per million gallons of water was employed (as post-treatment for water prechlorinated to provide residual chlorine through the filters) the typical musty taste and odor were almost completely eliminated, but complaints were received of other testes and odors in the distribution system. The presence of hydrocarbon type materials, together with aerosots, in the raw water supply of this plant has made treatment a highly complicated problem. Heavy rainfall has increased the difficulties and chlorine dioxide, together with activated carbon treatment, has proven to be of marked value even if *complete* success has not been attained.

The author has continued earlier studies of the bactericidal action of chlorine dioxide, both alone and when used in various ways in combination with chlorine. He presented the results of several laboratory experiments which indicate that, in water having a chlorine demand of about 1.0 ppm., application of chlorine dioxide alone fails to give complete bacterial kill until massive dosages are used, even though very considerable residuals may appear. He stressed the importance of employing prechlorination for disinfection when chlorine dioxide is used for taste and odor control, especially since the ortho-tolidine residuals shown by the later treatment might give the false impression that satisfactory disinfec- could be expected.

Programmer
Lt. Col. R. N. Clark
1st Service Command
Boston

The present studies disclosed that the color provided by chlorite residuals with ortho-tolidine should be read at about 30 minutes and again at about 90 minutes in order to obtain the maximum reading; the maximum value agrees well with that obtained by titration. The residual obtained is relatively stable, apparently about 0.1 ppm. persists for as long as nine days, but has very little action against coliform organisms.

"New Developments in Electronic Instrumentation," by D. M. Neilson, Foxboro Company, Foxboro, Mass.

The major difference between old and new instruments is a mechanical one—new divices are simplified, show better performance, have greater accuracy and increased sensitivity—and almost all improvement is due to the use of vacuum tube amplifiers. Eventually, one universal instrument may be developed which will be adaptable to all kinds of measurements. Special uses will probably continue to be filled by both mechanical and electronic instruments.

Mr. Neilson described a number of electronic instruments already in use in the water works field and suggested future applications based on known characteristics of these devices. The laboratory uses electronic pH measuring equipment; the use of titrometers and turbidimeters is predicted as a future application. Radio telemetering devices, with electronic equipment to replace line transmission, will be more dependable, more accurate. Electronic telemetering should be available shortly after the war.

Electronic flow meters for mainline service may utilize rates of under-water sound transmission to replace orifices and Venturi tubes.

In water treatment, high frequency spark discharges or supersonic sound waves seem likely to be used to accomplish flocculation, and disinfection may be realized by using supersonic waves with an alternating current frequency of the order of 50,000 cycles per *second.*

Mr. Nielson, in closing, referred to the several pipe and valve locating instruments, already on the market, which employ high frequency current (and fields) in their functioning as electronic units. Since similar instruments have been employed by armies for detecting and locating buried explosive mines, improvements in these locating devices may be expected following the war.

In explaining how electronic effects should speed chemico-physical reactions and flocculation, Mr. Nielson said that the equipment producing the high frequency (supersonic) sound waves or vibrations would involve the use of a vacuum tube oscillator generating AC power at frequencies in the vicinity of 50,000 cycles per *second.* This power would be fed to a converter unit, such as a piezo-electric crystal or a magnetically driven metalic bar, either being immersed in the flowing liquid. The crystal or bar, vibrating at the frequency of the oscillator sets up compression, or supersonic, compression waves in the liquid. Such action creates floc particles from dispersed solids, drives out dissolved gases by causing the fine bubbles to coalesce into large bubbles, which escape at the surface. Relatively small electronic flocculating units should be required for immersion in stream flows of relatively high velocities.

Mr. Nielson gave his audience a great deal to think about and secured close attention during his "crystal-gazing" talk which in several directions offered possibilities of intriguing caliber.

N.J. Sewage Works Assoc. To Honor John Downes

In the absence of a regular annual meeting of the N. J. Sewage Works Assoc. this spring, the officers of the Association met May 11 in Trenton.

John R. Downes, long-time secretary, tendering his resignation, was elected "Honorary Secretary" and it was decided to call the next regular annual association meeting "The John R. Downes Appreciation Meeting."

Edward P. Mollitor, Asst. Secy.-Treas., was elected Secretary-Treasurer.

WATER AND SEWAGE PATENTS

(OF RECENT ISSUE)

WATER PATENTS

Chlorine Detection by Electrode Depolarization. Henry Clay Marks (to Wallace and Tiernan Co., Belleville, N. J.). U. S. 2,370,871; Mar. 6, 1945; (Appl. 2-7-42). An apparatus for detecting quantitatively the amount of hypochlorous and chloramine chlorine in water by means of the depolarizing effect on a polarized cathode immersed in the water.

Method and Apparatus for Banding Tanks. John M. Crom, Washington, D. C. U. S. 2,372,060; Mar. 20, 1945; (Appl. 6-26-43). Method of prestressing concrete tanks.

Purification of Fluid Media. Jack T. Thurston (to American Cyanamid Co., New York, N. Y.). U. S. 2,372,233; Mar. 27, 1945; (Appl. 8-1-42). A process of removing cations from fluid media containing cations with an alpha-furyl substituted organic sulfonate reacted with and insolubilized by an aldehyde.

Water Purifying and Softening Apparatus. Rudolf Adler, Montreal, Quebec, Can. U. S. 2,372,640; April 3, 1945; (Appl. 11-13-40). An apparatus for base exchange softening of water with valves and arrangements for introducing regenerating substance.

Plug Valve. Frank Wheatley, Sr., Tulsa, Okla. U. S. 2,372,869; April 3, 1945; (Appl. 9-1-43).

Back Siphonage Prevention Valve. Clarence E. Ellis, Los Angeles, Cal. U. S. 2,372,940; April 3, 1945; (Appl. 4-7-41).

Liquid Treatment. Edward W. Welp (to Graver Tank and Mfg. Co., Inc., Chicago). U. S. 2,373,154; April 10, 1945; (Appl. 2-19-42). A liquid treating tank with a plurality of annular partitions concentric within the tank, said partitions not extending to the floor of the tank. Arrangement is designed to cause an outermost downflow zone and a plurality of inner upflow zones with means for introducing liquid and treating chemicals at top of outer zone and removing treated water from top of the several inner upflow zones. Settled sludge is scraped to local points in bottom for removal.

Lubricated Plug Valve. David M. Knox (to American Car and Foundry Co. New York). U. S. 2,373,964; April 17, 1945; (Appl. 7-2-43). Also U. S. 2,373,965.

Water Treatment. Henry A. Jackson (to Hall Laboratories, Inc., Pittsburgh, Pa.) U. S. 2,374,100; April 17, 1945; (Appl. 5-3-37) Process of softening water containing alkaline-earth metal compound, which comprises adding thereto crystalline alkali-metal tri-polysphosphate in an amount sufficient effectively to sequester the alkaline-earth metal in a but slightly ionized condition.

Treatment of Water Containing Chlorides Dissolved Therein. Howard D. Meincke, Jr. (to Howard D. Meincke Sr., Glencoe, Ill.). U. S. 2,374,116; April 17, 1945; (Appl. 3-25-44). Process to remove chlorides from saline water by adding a member of the phenyl mercury compound group, consisting of phenyl mercury gluconate and phenyl mercury glutamate, and removing the precipitated chloride compounds.

These patent abstracts being brief do not necessarily cover the entire scope of the invention described. If the reader becomes especially interested in any of these patents he should obtain printed copies of the complete patent, at 10 cents each, from the Commissioner of Patents, Washington 25, D. C.

Device For Grinding The Pistons and Measuring Chambers of Water Meters. Fielding B. Simpson (⅓ to Charles Plauche, Lake Alfred, Fla., and ⅓ to Harrington-Hoch, Inc., Richmond, Ind.). U. S. 2,374,784; May 1, 1945; (Appl. 10-19-42).

Sterilization of Water For Drinking Purposes. James A. Camelford (to Buckeye Laboratories Corp.), Cleveland, O.). U. S. 2,374,805; May 1, 1945; (Appl. 10-18-43). Process comprising subjection of water to pressures of the order of 1000 lb. per sq. in., raising the temperature of the water to a value less than that required to kill organisms by thermal action, and presenting it in the form of small discrete particles to the action of high vacuum to destroy the organisms and render the water potable.

Liquid Level Measuring Apparatus. Samuel C. Coroniti and Willy A. Schmidt (to General Aniline and Film Corp., New York). U. S. 2,375,084; May 1, 1945; (Appl. 6-23-43). An electrical measuring unit for tanks.

SEWAGE PATENTS

Process for Treating Fish Press Liquor. Sven H. Lassen, (½ to Philip R. Park, Inc., San Pedro, Cal. and ½ to Van Camp Sea Food Co. Inc., Terminal Island, Cal.). U. S. 2,372,677; April 3, 1945; (Appl. 9-11-39). Process for treating liquor from fish pressing to recover by-products.

Liquid Operated Classifier. John Degory Baron Phipps, London, Eng. U. S. 2,373,051; April 3, 1945; (Appl. 6-21-44). A classifier of hindered settling type comprising a static cone (with apex downward) and open top for overflow of water, feed inlet at top, two floating bodies, one in upper section and one in lower of cone, lower body to define a hindered settling column, upper body to define a classifying column, both variable. Sand chamber below and means for removing heavier particles.

Pneumatic Sewage Ejecting Apparatus. William G. Winter (to Yeomans Brothers Co., Chicago). U. S. 2,373,935; April 17, 1945; (Appl. 8-12-43). Combination collector and means for delivering air to collector to force sewage and sludge therefrom on proper operation of valves controlled by sewage level in collector.

Cake Discharger Mechanism. Jasper A. McCaskell (to McCaskell Filters, Inc., Los Angeles, Cal.). U. S. 2,374,363; April 24, 1945; (Appl. 5-22-40). In combination with a pressure filter a discharge screw for discharging the filter cake from filter press.

Apparatus for Aerating Sewage. Carl H. Nordell, Coloma, Mich. U. S. 2,374,772; May 1, 1945; (Appl. 11-24-41). A liquid aeration apparatus with a cascaded series of hydraulic air compressors, each comprising a head chamber, down-flow pipe connected thereto, liquid up-flow pipe from each reservoir to next head chamber leading to a down-flow pipe. Each receiving tank having capacity to allow for appreciable time of contact of the sewage and the air sucked into it by down-flow action from head tank above. From the final sump liquid can be returned to any head box and activated sludge can also be pumped to this sump from which it will be pumped to the head boxes.

THE WORTHINGTON DUAL FUEL ENGINE*

Its Background and Its Possibilities

By A. M. BOEHM
Engine Division
WORTHINGTON PUMP & MACHINERY CORP.
NEW YORK

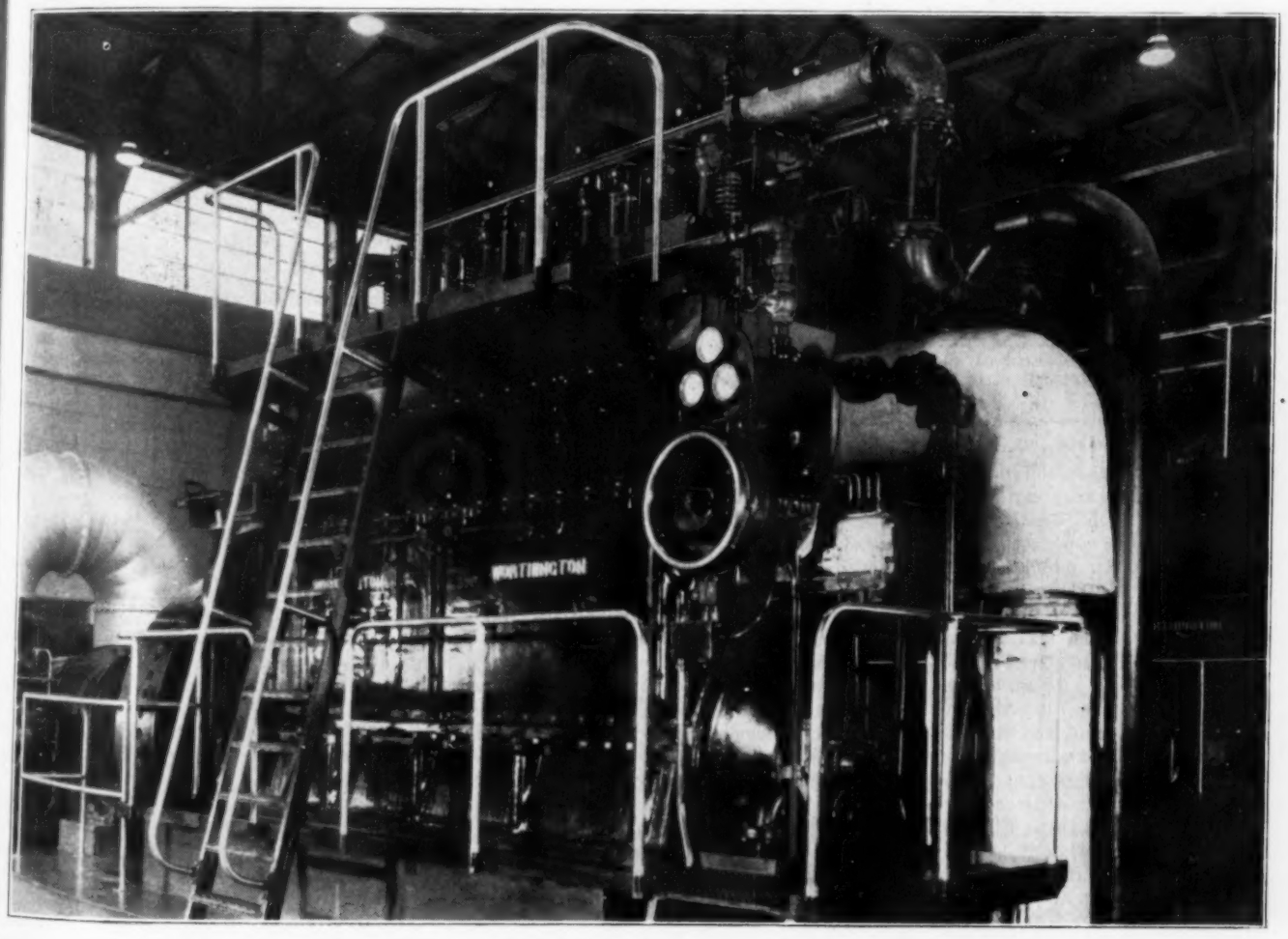
YOU recall, no doubt, the great amount of interest that was aroused in the early '30's over the rather novel idea of utilizing sewage sludge gas as a means for producing power by burning it in an internal combustion engine. Yet, previous to that time, all the essential parts for successfully carrying out this idea were well known and in extensive use separately. There were any number of plants with digestion tanks collecting the gas and using it in hot water heaters. Likewise, there were thousands of horsepower of gas engines in the commercial field converting the heat energy of combustible gases into useful power.

The Author

It seemed that all that was necessary to create a new use for sewage sludge gas and gas engines was a marriage of these ideas. Out of this marriage was born the "offspring" which was christened the sewage sludge gas engine. We have all seen this youngster grow from the kindergarten of little engines of 15 hp. up to those of giant stature, such as those represented in the larger sewage treatment plants of the country —notably in this plant (Tallman's Island) and other New York City plants.

I do not mean to dismiss lightly the pioneering work done by many members of your profession in solving application problems incident to this union of processes. In many cases your members prevented an outright divorce of this union by removing grounds of incompatibility. Like good nurses, they were called on to change the diet where the offspring and the food didn't get along. A little scrubbing to remove sulphur prevented high maintenance expense, or the formula had to be enriched or toned down before the engine would behave as well mannered engines should. Sometimes the offspring was put to work on jobs that were too hard for him, and your members were among the first to counsel—"Don't send a boy

*This paper was read by the author before the Long Island Section, N. Y. State Sewage Wks. Divn. It has been released by the Sewage Works Federation for publication in *Water Works & Sewerage*.—Editor.



Worthington Dual Fuel Engine at Tallman's Island Sewage Treatment Plant, New York City
(*On right is the selective fuel dial and pilot-oil pump—see close-up view on next page*)

to do a man's job." Rugged engines were selected for rugged jobs, and in that lies, to a great extent, the success that has characterized this marriage of existing processes. Today the sewage sludge gas engine has wide and general acceptance and has taken its place as a valuable member of the equipment family that goes to make up a modern sewage disposal plant.

Carrying our biological analogy on a little further, we can say that up to now our offspring has always answered to the name of "Otto," which name he gets from the thermodynamic cycle on which he operates. Briefly, this Otto cycle is the same one on which automobile engines operate. It is characterized by four events, occurring and recurring in the same sequence. From these four events it gets the name of four stroke cycle, or, for simplicity, four cycle. These events are:

1. The intake stroke, during which the piston sucks into the cylinder a mixture of air and gas which has been prepared at about atmospheric pressure in such proportion that it can easily burn if supplied with some external source of heat, such as a spark plug.

2. The compression stroke, during which the mixture is compressed to about 125 lbs./sq. in. and, at a certain point near the end of compression, is made to burn by means of a timed spark.

3. The expansion stroke, during which the heat developed by the chemical action of the burning charge expands the trapped gases and forces the piston downward, thus delivering energy to the crankshaft.

4. The exhaust stroke, during which the gases from the burnt out charge are expelled from the cylinder in preparation for the next intake stroke.

This cycle of events has been in use for many years and has been a very satisfactory source of power. It turns into useful work about 27% of the total energy (BTU) in the fuel supplied to the engine. It is this type of engine which may be seen here at Tallman's Island and at all other sewage disposal plants that utilize sewage sludge gas for power.

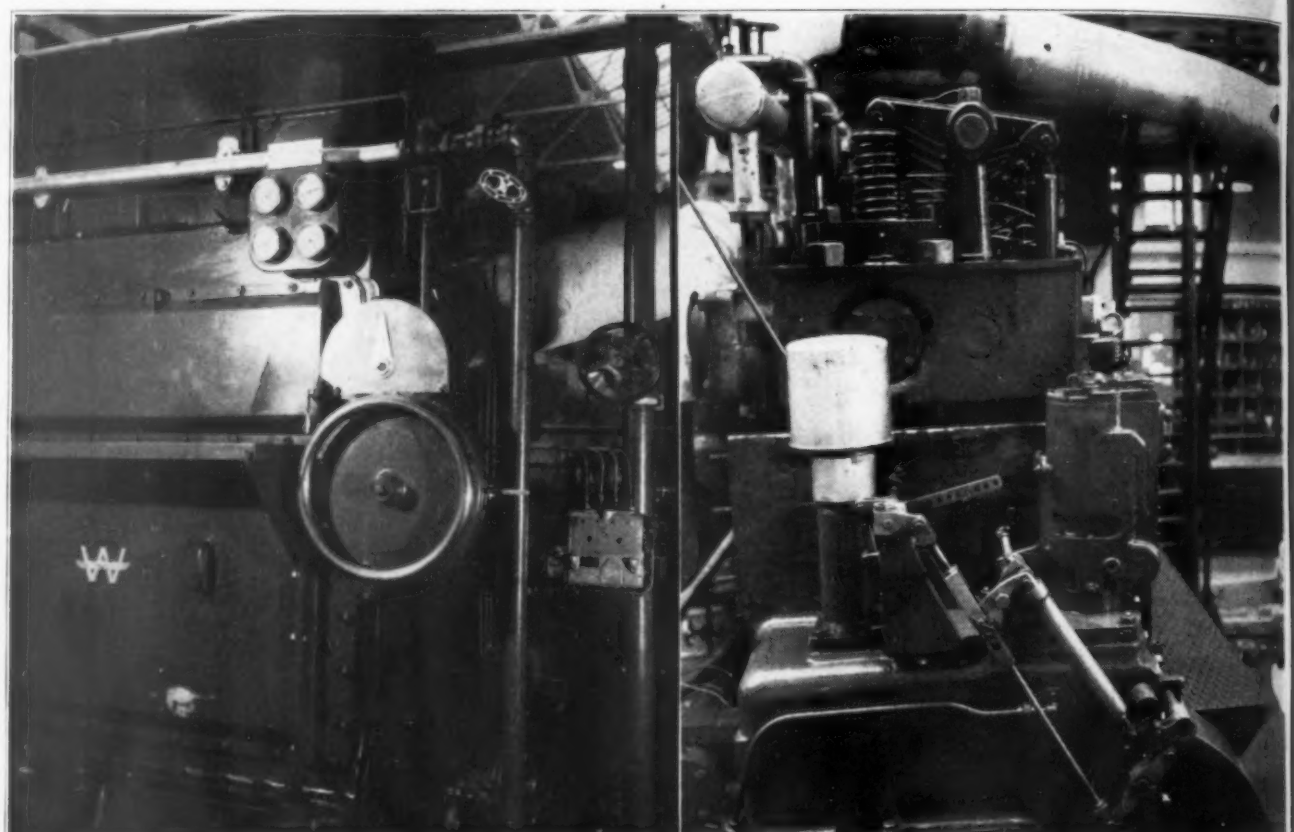
As I said, our boy "Otto" has been with us for a long time, but he has a brother who was born much later than he and who bears the name of the doctor who not only brought him into the engineering world but conceived him. Biologically this doesn't sound right but it's the truth, for I refer to the Diesel engine, which has made such gigantic strides in the last decade. The Diesel's chief claim to fame is the fact that it can do a greater amount of work on a given quantity of fuel than any other prime mover yet developed. It gets that way mainly because on the compression stroke a charge of air is squeezed to such a small volume and hence, high pressure, that when fuel oil is injected near the end of the compression stroke the air is hot enough to ignite and burn the oil without any external source of heat or ignition spark being necessary.

Efficiency and Compression Pressures

Since the efficiency of the cycle is very materially affected by the compression pressure, the one increasing with the other, and since the Diesel compresses to 450-425 lbs./sq. in. as compared to "Otto's" measly 125 lbs. pressure, it stands to reason that the Diesel is a much more economical feeler to have around than our boy "Otto". This is borne out by the test results showing Diesel efficiencies of about 35% compared to Otto's of 27%.

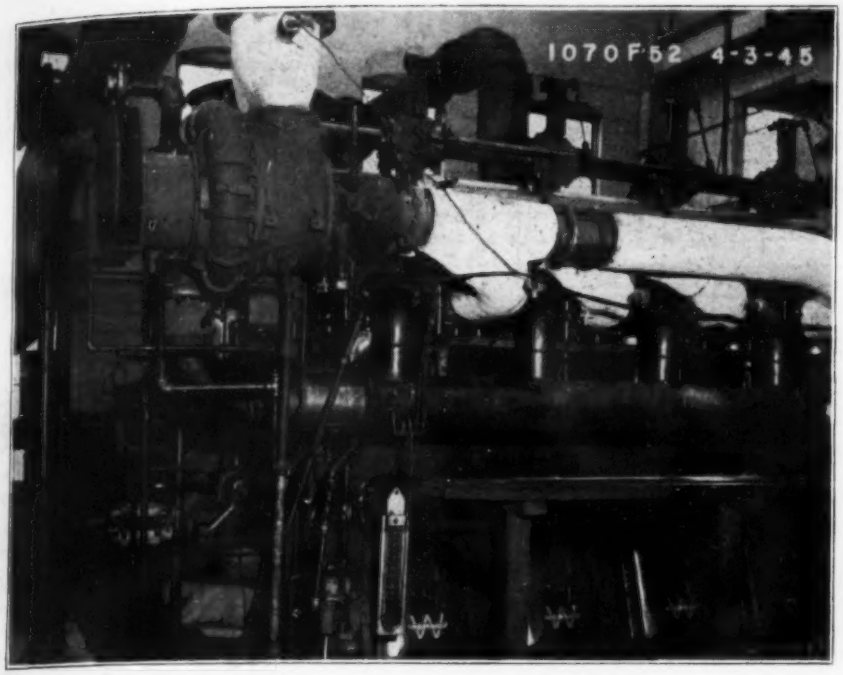
The natural reaction to this is—why not make "Otto" squeeze his charge of air and gas to higher levels and thus gain in efficiency? No reason at all, except—

1. Everyone knew that if Otto's compression pressure was raised too much, the near perfect air-gas mixture had the annoying habit of igniting by itself and not waiting for the spark to direct it. So compression pressures were kept around 125 lbs. for all-round best results.



Control End of a Dual Fuel Engine
(*Showing selective fuel dial and pilot-oil pump*)

Close-Up of the Governor and Control Gear
(*An important fuel economy unit of the engine*)



Exhaust Side of Supercharged Dual Fuel Engine
(Note important turbo-supercharger at upper left)

2. Everyone knew that even with 125 lbs. compression pressure, if the gas contained some touchy constituent like free hydrogen in large percentages, the mixture had a tendency to be over-eager and ignite prematurely.

What harm was done if it did pre-ignite?

1. Power was lost.
2. Dangerous peak pressures developed that were injurious to bearings and running gear.

So for many years it was agreed that Otto's pressure had to stay low and he went along in an efficiency rut. Of course, as early as 1928 one American manufacturer, The Nordberg Manufacturing Co., succeeded in burning gas on the high compression Diesel cycle, but only by separately compressing the gas to 1100 lbs. and injecting it into air charge in the cylinder at or near top dead center. In this way dangers of pre-ignition in the cylinder were avoided, but only at the expense of adding complications and hazards with the 1100 lb. gas compressor. As a matter of fact, to get the gas to burn consistently a small amount of fuel oil, called pilot oil, had to be injected to steady the combustion.

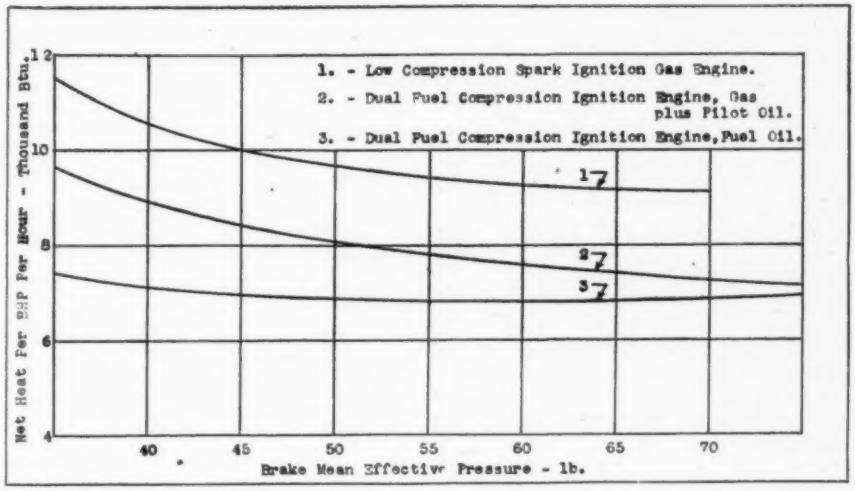
During the period from 1937 to 1940 several English manufacturers of gas and Diesel engines, chief among them the National Gas and Oil Engine Co., successfully accomplished the merging of Diesel with Otto. High compression engines were developed in which fuel gas was mixed with air at atmospheric pressure and compressed to Diesel levels with almost phenomenal gains in efficiency and actually with lower exhaust temperatures than the Otto cycle. Most of these engines used pilot oil to ignite the highly compressed fuel charge, although some were built with spark ignition.

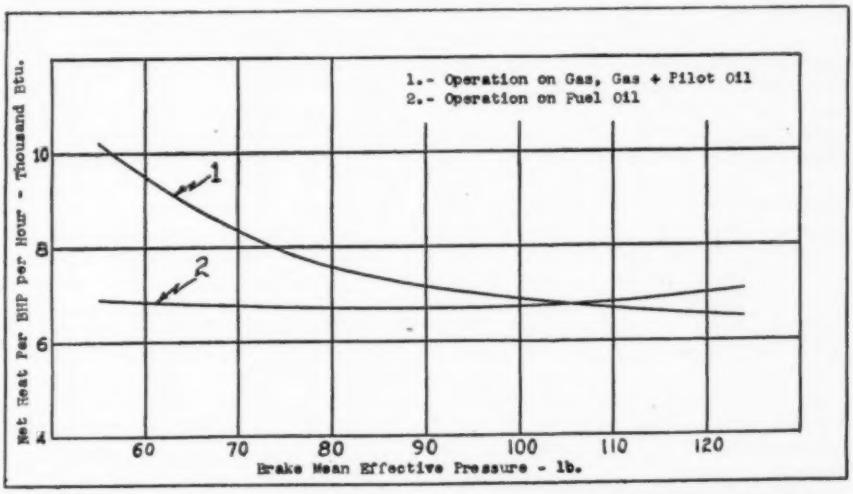
Recent Developments

The results in England were followed with great interest by Worthington, and during the period from 1941 to 1943 developments were started along the same lines and results were very encouraging. The first thing that was found was, that not only did pre-ignition not occur at 475 lbs. compression, but that it was difficult to get the air-gas mixture to fire at all unless a small amount of pilot fuel oil was injected during the compression stroke to initiate, propagate and sustain ignition. In other words, the pilot oil had become the spark plug.

The most plausible explanation at the present time is, that instead of the air-gas mixture being made easy to burn, as in the Otto cycle engine, the mixture has to be difficult to ignite spontaneously and is close to the lower limit of inflammability of the particular gas on which it is operating. Pre-ignition troubles are thereby relegated to the limbo of "gone and forgotten".

Worthington made continuous progress in its development, so that on August 17, 1944 a public demonstration run was made before a group of inter-





Fuel Consumption Curves Comparing Unsupercharged and Supercharged 16x20 Dual Fuel Engines

Fig. 1—(above) Compares results with gas and pilot-oil only as against gas and fuel oil when the dual-fuel engine is not supercharged
Fig. 2—(below) Presents the same comparison when the dual-fuel engine is supercharged, revealing the added fuel economy resulting from supercharging

16 X 20 PRESSURE-CHARGED GAS-DIESEL

RPM	BMEP PSI	ENGINE										TURBO-CHARGER							GAS MANIFOLD PRESS., #PSI	FUEL CONSUMPTION NET BTU				
		COOLING WATER			LUBE OIL			EXHAUST TEMP. ELBOW				AIR			EXHAUST									
		PRESS., PSI	TEMP., IN °F	TEMP., OUT °F	MANIFOLD PRESS., PSI	TEMP., IN °F	TEMP., OUT °F	CYL. #1 °F	CYL. #2 °F	CYL. #3 °F	CYL. #4 °F	INLET TEMP., °F	OUTLET TEMP., °F	OUTLET PRESS., "HG.	TEMP., IN °F CYL. #1-4	TEMP., IN °F CYL. #2-3	PRESS., IN "HG CYL. #1-4	PRESS., IN "HG CYL. #2-3	TEMP., OUT °F		GAS BTU/HR IN 1000's	PILOT OIL BTU/HR IN 1000's	GAS BTU/BMP-HR	TOTAL HEAT BTU/HR IN 1000's	TOTAL HEAT BTU/BMP-HR	BAROMETER "HG CORRECTED
327	116	25	114	118	27	115	122	786	783	784	785	90	123	$6\frac{5}{8}$	820	825	$3\frac{1}{8}$	$3\frac{1}{8}$	802	12.5	4720	372	6110	5093	6600	28.9
327	112.5	28	113	118	27	115	122	775	775	775	778	90	122	$6\frac{1}{2}$	818	823	3	$2\frac{7}{8}$	795	14.0	4631	372	6170	5004	6670	28.9
327	84.4	30	110	114	27	115	122	699	694	692	699	87	109	$5\frac{1}{8}$	715	720	$2\frac{7}{8}$	$2\frac{5}{8}$	697	14.5	3750	372	6670	4121	7320	28.9
327	56.25	28	108	112	28	113	116	608	600	608	610	82	99	$3\frac{3}{8}$	600	605	$2\frac{1}{4}$	$1\frac{7}{8}$	595	15.0	3383	372	9020	3755	10,000	28.9

Tabulation of Data Revealing Fuel Consumption Ratings for Supercharged Dual Fuel Engine

ested engineers on a 500 hp., 4 cylinder, 16 x 20 engine operating at 327 rpm. At that time the engine carried full load (75 lbs BMEP*) on either all oil or all gas plus pilot oil (the gas in this case being 800 Btu./cu. ft. mixed natural and manufactured) and could be taken from one fuel to another without a shutdown or without dropping load. This was the first time in America that an atmospherically charged, high compression gas engine had been publicly announced.

Its Interest to Sanitary Engineers

Among the guests that day were a number of sanitary engineers, whose interest in such an engine was naturally directed toward its use on sewage sludge gas. They immediately saw the advantages of this engine with a fuel consumption about 25% lower than the currently used Otto cycle type of engine, and with the ability to change over from gas to oil and vice versa or any combination of the two without interrupting the load. This meant that for the same amount of gas available, a sewage disposal plant with this new type of engine could operate about 30% more capacity of engines or equal capacity of engines for 30% longer periods than a plant with the less efficient Otto cycle engine.

What they saw that day was a great advance in the art of gas engines, but it wasn't enough for them. They visualized the engine being capable of doing not only what they had seen but *in addition* being able to operate on *any* proportion of *both* fuels simultaneously. Supplied with such an engine they could use sewage sludge gas up to the fullest extent of the availability of the gas with fuel oil as the alternate or fill-in fuel, making up the balance of the heat input necessary for the engine to carry its load continuously.

*Brake Mean Effective Pressure (BMEP) is the average cylinder pressure on the explosion stroke.

Fuel and Governing Controls Perfected

This desire constituted a nice problem in fuel and governing controls, which was immediately attacked and successfully solved. On November 29, 1944, a second public demonstration run was made during which, with the new controls, the engine performed equally well whether running on 95% gas and 5% pilot oil, or 100% fuel oil, or any proportion of gas and oil between these two limits.

So much for the background of the engine, one variation of which you have seen here at the Tallman's Island plant today. This engine is the first installation made in America and this plant was chosen because—

1. It had an engine in operation that was almost a duplicate of the one on which the shop research work was done.

2. It presented an opportunity to observe operation on both sewage sludge gas and straight manufactured gas.

From what we have been able to observe here, we see no reason why these high compression gas engines cannot be rated the same on sewage sludge gas as on natural gas or fuel oil, with ratings based on 75 lb. BMEP.

From the very beginning of this development our research department trained its sights on the ultimate form of this engine, namely, the supercharged dual fuel engine. In this they were entirely successful. To the best of our knowledge, this had never been done before, although we had accumulated a great deal of knowledge and experience in supercharging our Diesel oil engines.

We were assisted greatly by the fact that the inlet valve used in the straight dual fuel engine was of such design that the air entered the cylinder first and was then followed by the gas, the two being kept separate as long as possible for safety reasons. In other words, we could control the entry time of the gas with respect to the air. By being able to time the gas entry, loss of gas during the time both air and exhaust valves are open is avoided. This time gas valve was one developed some years previously to help solve a problem of pre-ignition on an Otto cycle engine using high hydrogen gas and is fully covered by patents.

Our results with supercharging have lived up to all our expectations. We have had no difficulty in carrying 112.5 lbs. BMEP continuously on gas, which is the same rating given to our supercharged Diesel oil engines, plus an adequate reserve for overloads. This rating represents an increase of 50% in power output over unsupercharged ratings of 75 lbs. BMEP. Fuel consumptions have been reduced another 7% at full and 75% load from the unsupercharged dual fuel results, but are slightly higher at 50% load than we should like to see. This point is receiving treatment now for improvement of the situation.

Press announcements to the effect that a high compression, 4 cycle, dual fuel engine had been successfully supercharged for the first time in internal combusion engine history were made on April 10, 1945. Worthington is indeed proud to have been able to make this outstanding contribution to the field of internal combustion engines.

U-1 Order Amended

An amendment of Utilities Order U-1 was issued effective June 2, 1945. It eliminated the restrictions affecting the expansion of utilities facilities except for the construction of buildings.

The order no longer gives priorities assistance on building construction materials and requires approval on Form WPB-2774 where construction materials for a building exceed $25,000.

The inventory controls are now applicable only to material acquired by a utility for use in maintenance, repair or as operating supplies, or minor plant additions.

SECTION MEETINGS SUCCESSFUL SUBSTITUTES FOR NYSSWA ANNUAL SPRING MEETING

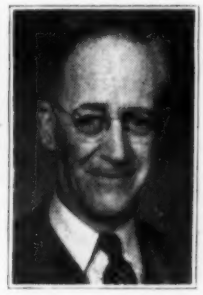
IN LIEU of the annual Spring Meeting of the NYSSWA, the regular meetings of the several sections of the association have served as successful substitutes. The first of these meetings held by the Western Section in late April was reported in the May issue of *Water Works and Sewerage.*

Genesee Valley
Glen Searles
Supt. Sew. Tr.
Rochester

Chairmen of Section Meetings

Long Island
Henry Rath, Supt.
Tallman's Island
New York City

Capitol
J. A. Fitzgerald
Supt. Sew. Tr.
Hudson Falls



Central
H. H. Wagenhals
Dept. of Health
Syracuse

The other four sections have likewise held meetings: The Genesee Valley Section in Lyons, on May 5; the Long Island Section at the Tallman's Island Sewage Plant, Long Island on May 23; the Capitol Section in Albany on June 16; and the Central Section on June 16, in Syracuse.

Attendance at all of the meetings was excellent. The Long Island Section, with its large membership, and with the New York City membership and Dept. of Public Works employees to draw on, had an attendance of over 150, about half of whom were members of the association. The other three meetings drew approximately 50 to 55 each.

None of the meetings exceeded the ODT restrictions as to travel or hotel reservations, but each served a double purpose, first, the usual benefit derived from sectional meetings and get-togethers, and secondly, the presentation of papers normally scheduled for the annual spring meeting of the association.

Genesee Valley Section

In the absence of E. A. Marshall of Geneva, Secy. of the Genesee Section, Glen Searles, Supt. of Sewage Treatment at Rochester, acted as Chairman, and George Moore, Dist. Engr. of the N. Y. State Dept. of Health, acted as local host in charge of general arrangements.

Treat of the day was the "Chicken a-la-Carte" luncheon served by the local fire house boys in the basement of the fire house. Beer was available before lunch, from a small bar for that purpose, but gave way to steaming cups of coffee served with a heaping plate of creamed chicken and gravy, vegetables, mashed potatoes, salad, and home-made pie for dessert.

Sodium Nitrate in Waste Treatment

Prior to the sumptuous repast, William A. Ryan, Consulting Chemist on Waste Treatment, Rochester, presented data on experiences with the use of sodium nitrate in the control of septic conditions in lagooned canning wastes.

Whereas Clark and Gage first reported the ability of nitrates to prevent odors in sewage and wastes, it was not until 1923 when nitrates were first practically applied for that purpose by Metcalf and Eddy at Boston to eliminate odor nuisance in the Blackstone River.

In 1940 N. H. Sanborn, of the National Canners Assoc. conducted field tests on the use of sodium nitrate in lagoons. Mr. Ryan observed these experiments which were conducted near Rochester and later utilized the method at Red Creek, N. Y.

The method is now used in many places in the corn belt where the usual procedure is to screen the corn waste liquor and pump it to a lagoon with sodium nitrate being added to the pump sump following the screening process. At first enough nitrate was added to satisfy 50 per cent of the BOD., but this dosage was later decreased and now the arbitrary standard is to add 150 lbs. of commercial sodium nitrate (16 per cent nitrogen) to the waste from 1000 cases of No. 2 cans.

The purpose of the sodium nitrate treatment is to furnish oxygen to the bacteria decomposing the waste organic matter, after the dissolved oxygen in the water is depleted. The availability of the oxygen from the nitrate makes it unnecessary for the bacteria to attack sulphates for the purpose of obtaining oxygen and thereby prevents the formation of hydrogen sulfide and septic conditions.

The full scale experiment conducted at Red Creek, N. Y., was on pea waste. All process water, waste, and wash water, amounting to approximately 20 gal. per case of No. 2 cans, plus the ensilage juice from the pea vine stacks was pumped to the lagoons. Ten tons of sodium nitrate were added to the waste during the month of July. (Sodium nitrate is very soluble; 87.7 parts will dissolve in 100 parts of cold water, and although it was added to the pump sump it could easily be distributed in the lagoon by dragging in a burlap bag behind a boat.)

The pea waste had a 5-day BOD. of 1500 ppm. and the ensilage juices had a 5-day BOD. of 51,000 ppm. The first peas were processed on July 12, and the first sample of the treated lagoon was collected on July 31. While the color of the lagoon liquid remained dark until late fall, the BOD. had dropped to 750 ppm. within the first 20 days. Ten days later entrance of the strong ensilage juice pushed the BOD. of the lagoon liquor up to 1440 ppm., but within a month it had dropped to 210 ppm., and in six more weeks to 93 ppm. Odors were slight in the early days of the test but disappeared before the first month's operation was over.

In the matter of canning-waste treatment by lagooning, Mr. Ryan says it is advisable to keep the depth of the lagoon at less than four feet, to secure favorable effects of wind action. The lagoon should be located near a stream into which it may be discharged during high water. Better results with the sodium nitrate treatment will be obtained if there is a sewage effluent which may be discharged into the lagoon, as seeding with that type of organism helps. This is particularly true in the case of caustic wastes from lye peeling plants. If pea stack juice is added to a lagoon, an extra amount of sodium nitrate will be required.

Sodium nitrate which contains 56.4 lb. of available oxygen per 100 lb. of the salt, yields 19.31 lb. of ammonia which is useful in neutralizing organic acids and controlling the pH of the lagoon. This particular experiment showed that the nitrate not only controlled odors in the lagoon, but played a big part in oxidizing the organic matter making it possible to discharge a

clear liquid from the lagoon within a few months after the waste has been added thereto.

New Electrical Equipment For Sewage Plants

By means of slides, H. Vance Crawford, Application Engineer of the General Electric Co., showed the audience a number of new innovations in electrical equipment that will be available after the war. Some of these new items are available now. Perhaps not all of the items will find application in sewage plants but there is no doubt that the future design of new plants and the renovation of old ones will call for many of them.

Cable filled with nitrogen gas under slight pressure prevents the entrance of moisture to cause short circuits. New type transformers are available as is enclosed switch gear. Streamlined switch gear, all enclosed, will undoubtedly add to both the safety and the appearance of sewage plant pumping stations.

Portable arc welders capable of being used to thaw pipes, will soon be available and should make the job of maintenance in water and sewage plants much easier than heretofore.

Heaters of several kinds and types are another item that will be of great interest to sewage plant operators. There is the industrial heater which combines a fan and heating coil for use in pump rooms and elsewhere. Strip heaters, immersion heaters, and heating cords are likewise of interest. These strip heaters will find use as heaters in incubators, in small rooms needing auxiliary heat, in locations needing warmth to maintain dry conditions. Immersion heaters are useful in water baths, or for heating water for use, and have been used to warm water being used in chlorinators, for the purpose of preventing chlorine ice.

A new heating cord which may be laid in a soil trench, wound around a pipe, placed in the sealing water around a sludge digestion gas holder, or laid in gutters that tend to freeze seems to be the answer to most any problem that arises because of cold weather. These cords come in different lengths, the 60 foot length for 110 volts, and longer lengths for 220 volts. These cords, which loop back on themselves, are simply plugged into an ordinary socket and produce just enough heat to accomplish the desired purpose.

Still another innovation is a method for keeping the winding of motors dry. The system consists of a circuit which delivers 10 volts of current to the motor winding when the 110 volt or 220 volt current is cut off. The small amount of current is just enough to keep the winding warm and dry.

Sewage Research Pays Dividends

Speaking on the subject of "Sewage Research," Dr. George E. Symons, Assoc. Editor of *Water Works and Sewerage*, defined research as "the logical satisfaction of an innate curiosity; it answers the question of what, where, when, and why—mostly why."

Genesee Valley
George W. Moore
Dept. Health
Rochester

Long Island
G. Geo. Anderson
Rockville Center

Capitol
W. J. Erickson
Dept. Health
Albany

Central
Uhl T. Mann
Supt. Ley Creek
Syracuse
(Also programmer)

Section Wheelhorses!!!!

In the pursuit of the answer to the question why, it is often necessary to try ten ideas before one is found to be good. Unfortunately, many municipal administrators do not believe that the pursuit of even one research idea is worthwhile, let alone perhaps ten. But sewage research is worth every effort and expense put on it.

To fully understand research one must realize that there are two phases of research, first, laboratory study, and secondly plant observation. Collection of operating data is research if the data are studied with a view to improving operation. Any work expended to collect data or information on the why of sewage strengths, variations, characteristics, action, or idiosyncracy of treatment is sewage research.

Laboratory studies may include the study of power and pumping versus solids content in sewage sludge, variations in chlorine demand, effect of storm flow on characteristics of sewage, as well as improvements in laboratory technics and many other investigations.

As an example of the dividends of research Dr. Symons cited some of the work done in Buffalo where early studies on the chlorine demand of the sewage eliminated the need for the construction of an up-sewer chlorination station thereby saving far more than the cost of the studies. Later study at the sewage treatment plant on chlorination control made it possible to save more than 10 per cent on the cost of chlorine by utilizing prechlorination and dosage control to follow the changing chlorine demand, and studies on sludge dewatering resulted in a reduction in chemical costs of $2000 a year. Probably the most dramatic and largest dividend of the Buffalo research studies was the result of the study of industrial waste and the development of a formula for special sewer service charges to industry, the income of which is more than half of the cost of the operation of the laboratory each year.

It is not alone in the large plant where sewage research pays; the small plant too may profit. Analysis of the digested sludge and its marketing may bring income, and studies on chemical dosage are generally profitable, since chemical economy yields perceptable annual savings. Studies and observations on flows and pumping may often lead to lowered power costs and better operation of plants is usually a side result.

There are other dividends to be obtained from sewage research, dividends that are intangible, and not measurable in money values. These dividends include the respect and gratitude of the profession, increased professional standing for the plant and its personnel, better operation, and improved public relations through appreciation of efforts by the plant management.

Sewage Research
Dr. Geo. E. Symons
Assoc. Editor
Water Works and Sewerage
(Pres., NYSSWA)

Electrical Equipment
H. Vance Crawford
Application Engr.
General Elec. Co.
Schenectady

Long Island Section

Tallman's Island Activated Sludge Sewage Treatment Plant on Long Island, a show place both as to design and equipment, as well as a model of one of the best operated plants in the country, was the setting for the Long Island Section meeting. Host and Chairman of the meeting was Henry Rath, Chief Operator of the Tallman's Island plant. In charge of the entertainment and food was "Jim" Hogan, of the Bowery Bay plant, and watching over the whole affair was C. George Anderson, Secy.-Treas. of the Section

and former Supt. of the Rockville Center Activated Sludge plant.

In addition to the many members and guests from New York and vicinity, the section meeting was honored by the presence of a past president of the Federation of Sew. Wks. Assoc., A. M. Rawn, General Manager and Chief Engineer of the Los Angeles County Sanitation District.

Small Plant Operation

"Bill" Hogan operates the Cedarhurst, L. I. sewage plant. Compared

Programmers

Prof. E. J. Kilcawley, Rensselaer Poly, Troy

Dwight B. Coleman, Supt. Sew. Tr., Cortland, N. Y.

W. P. Gyatt, Supt. Sew. Tr., Syracuse

to the one in which the meeting was held, Bill's plant could be put in one of the grit chambers. But that doesn't mean that Bill doesn't have his share of problems or that the plant requires no attention. As a matter of fact "Bill" Hogan gives the Cedarhurst plant a lot of attention and the operation is excellent.

The Cedarhurst plant has a wet well of 1262 cu. ft. and three pumps, one of 350 gpm. and two of 750 gpm. capacity. Treatment consists of two-hour sedimentation and pre- and post-chlorination. As a standby unit there is a 60-hp. Diesel engine, and a few years after the plant was constructed, a grit chamber was installed ahead of the sump to protect the pumps. The laboratory lacks any equipment except for the determination of pH and residual chlorine.

One cardinal rule "Bill" Hogan follows is to keep the plant clean, and he urges operators of plants, large and small, to be of service to designing engineers by passing along suggestions gleaned from operation—this in the interest of better and more trouble free plants.

Dual Fuel Engines

Latest thing in gas engines is the dual fuel engine, and the first one in the sewage field is located at the Tallman's Island N. Y. City Plant. For that reason the choice of Mr. A. M. Boehm, Engineer of the Worthington Pump and Machinery Co. to explain its operation was a happy one.

As an introduction, Mr. Boehm reviewed the history of the gas engine. In the early thirties, the gas engine was introduced to sewage plant operators. This engine which operates on the auto-cycle, of intake, compression, expansion, and exhaust was only 27 per cent efficient on its conversion of heat energy to power. The Diesel engine, which has a compression of 450-475 lb. per sq. in., compared to the 125 lb. of the auto-cycle engine, is 35 per cent efficient.

It was not found possible to obtain higher compressions of gas because of complications of firing, but about four years ago, it was demonstrated that the two engines could be "married" so to speak, thereby producing an engine with 30 per cent more power than the ordinary gas engine. Using gas, plus 5 per cent of fuel oil, this engine was a step forward but the engineers wanted an engine that would operate on any combination of gas and fuel oil. This system was accomplished last year, and the dual fuel engine, which automatically will change the fuel combination of gas and oil as the gas is available, was developed.

This dual fuel engine will operate on any combination of gas and oil from 5 per cent oil and 95 per cent gas to 100 per cent oil. It is possible to convert present gas engines to this new type of engine by certain changes in the engine head and the addition of the dual-control system.

The next step in the development of the dual-fuel engine was to introduce supercharging. The supercharger operates on a turbine installed on the exhaust discharge. By the use of the supercharger, the power out-put of an engine is stepped up by 50 per cent, and at the same time the fuel consumption is reduced another 7 per cent, if oil is being used as the fuel. It is predicted that these dual fuel engines will increase the savings already possible in sewage plants where gas engines are used for power.

Capitol Section

Prior to the luncheon meeting of the Capitol Section at a restaurant just outside of Albany, an inspection trip was held at the Colonie plant.

More Programmers

A. M. Boehm, Engineer, Worthington Pump Co.

W. J. Hogan, Supt. Sew. Tr., Cedarhurst, L. I.

W. A. Ryan, Cons. Chem., Rochester

Sludge

Prof. E. J. Kilcawley, Prof. of Civil and Sanitary Engineering at Rensselaer Polytechnic Institute, presented a very informative and basic paper on "Sewage Sludge." Beaming the paper at the operator who has had no fundamental training in sewage treatment, Prof. Kilcawley defined domestic sewage, explained its complex character and the bacteria it carries, and discussed the production of sludge in plain sedimentation tanks, its characteristics, how to handle it, and what happens to it during digestion.

Digestion of sludge will accomplish the stabilization of organic matter, reduction of sludge volume, and improve drainability. During digestion bacterial activity must be controlled in the right channels or the process will literally go "sour".

Prof. Kilcawley concluded his talk with advice on the operation of Imhoff Tanks, and on the operation of separate sludge digestion tanks.

Some Here—Some There

Prof. C. L. Walker, Cornell Univ., Ithaca

Ben L. Smith, Cons. Engr., Albany

J. W. Hogan, Supt. Sew. Tr., Bowery Bay, New York City

R. A. Gould, New York City

A. M. Rawn, Los Angeles, Cal.

W. Donaldson, New York City

H. O. Johnson, Supt. Sew. Tr., Great Neck, L. I.

J. M. McCrea, Chi. Pump Co., Syracuse

A. G. Martin, Comr. Pub. Wks., Tn. Tonawanda, Kenmore

Mr. H. Vance Crawford repeated the illustrated talk which he had presented at the Genesee Valley Section in Lyons.

Round Table

Under the direction of Morris M. Cohn, Sanitary Engineer of Schenectady, and Editor of *Sewage Works Engineering*, the Round Table, which is generally a part of the NYSSWA Spring Meeting, was held. The first question was "How does one remove top sludge or scum from digestion tanks?"

J. A. Fitzgerald of Hudson Falls, told how they had found that scum reformed in 18 hours after it had been hosed down. Sixteen tons were removed through manholes and analysis of the material indicated a high percentage of mineral oil.

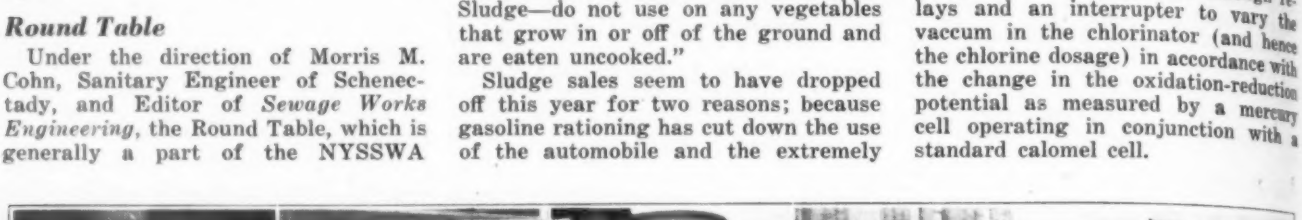
Other methods of handling the problem were discussed; these included sprays, recirculation of supernatant liquor, and the addition of ammonium sulphate, which experiment has shown will change the consistency of the scum, increase gas production and generally improve conditions.

Another question concerned the prevention of algae growths in final tanks. Based on the experience of **Henry Rath** and his "duck pond," (see picture) it was suggested that ducks be used in the final tanks inasmuch as they eat up the algae. **Uhl T. Mann** said that at the Ley Creek in Syracuse, a residual chlorine content of 0.5 ppm. was sufficient to keep algae growths down.

The value of sewage sludge as a soil builder or "soil amendment" was thoroughly discussed and **Prof. C. L. Walker** of Cornell University pointed out that it was not a fertilizer, per se, but had many ingredients which were of considerable benefit to soils. On the matter of where to and where not to use sewage sludge, **Morris Cohn** of Schenectady said that the bags in which the Schenectady sludge was packed contained the legend, "Sewage Sludge—do not use on any vegetables that grow in or off of the ground and are eaten uncooked."

Sludge sales seem to have dropped off this year for two reasons; because gasoline rationing has cut down the use of the automobile and the extremely wet spring had so delayed planting that farmers and victory gardeners alike had not prepared the soil even at that late date in many instances.

Ben L. Smith, Consulting Engr. of Albany, pointed out that some misunderstanding had arisen in the minds of many municipal officials regarding the cost of engineering plans. The publicity given to the fact that the N. Y. State Planning Commission would furnish two per cent of the cost of the project (for plans) if the municipality would match the two per cent, had led many persons to believe that four per cent was a "ceiling price" on engineering plans. This is not so—in most instances four per cent is not sufficient to cover the consulting engineer's overhead. Six to eight per cent is more reasonable, and the percentage will be higher on smaller jobs.



Inspection Trips

Langford, Symons and Cerny at Bowery Bay. *Ley Creek grit channels, Syracuse* *Fred Welsch enjoys a hot dog at Tallman's Island* *Ley Creek main building, Syracuse* *Henry Rath and Designer Glen Holmes at Ley Creek*

Central Section

After the morning session and lunch, the meeting at Syracuse adjourned to the Ley Creek Sewage Plant where the host, and re-elected secretary of the section, Uhl T. Mann, conducted a tour of the plant.

Chlorine Potential Control

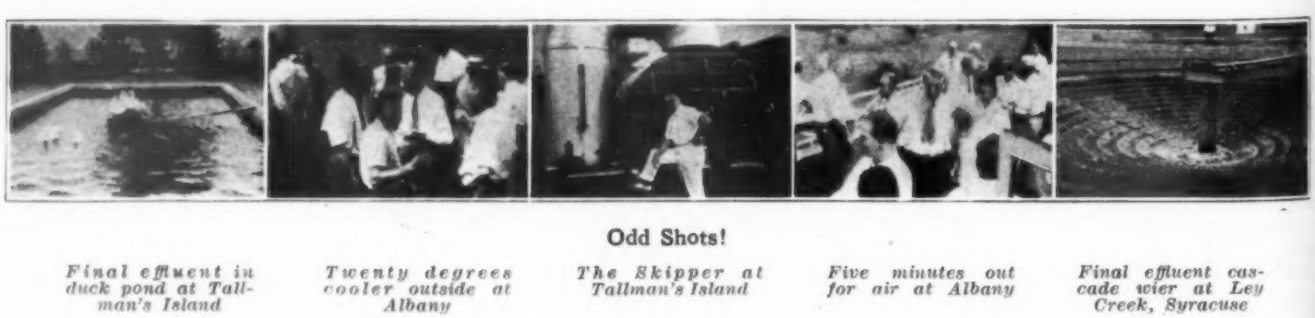
Mr. William P. Gyatt told of the experiments at the Syracuse plant on the use of the chlorine potential cell to control sewage chlorination. To date the experiments have not proved fully satisfactory but experimental work is continuing on the use of this equipment which operates through relays and an interrupter to vary the vaccum in the chlorinator (and hence the chlorine dosage) in accordance with the change in the oxidation-reduction potential as measured by a mercury cell operating in conjunction with a standard calomel cell.

Repair of Digester Tank Cover

Cortland has a concrete digestion tank with a fixed cover of concrete which is set over the upper periphery of the tank walls. At some time past this cover had became ruptured, apparently due to filling to a hydrostatic pressure. Because of the rupture in the cover, it was not possible to retain gas in the tank. The tank was emptied, and muslin strips placed in the crack and around the point where the cover rested on the wall. With each layer of muslin was added a layer of "insolmastic," a bituminous product. Whereas this treatment apparently stopped the leak of liquor, gas still escaped. It was believed that the gas was escaping from a crack, which had not been found, in the dome. To stop this leak, the tank was filled with sewage and 300 lb. of bran added. The gas leak stopped. Some one suggested Bentonite for the same crack filling purpose.

Air Flocculation Sewage Treatment

Because of the lack of sludge bed capacity during the past winter and the lack of means for concentrating activated sludge it was found necessary to adopt a new treatment to produce a heavier and more concentrated sludge.



Odd Shots!

Final effluent in duck pond at Tallman's Island *Twenty degrees cooler outside at Albany* *The Skipper at Tallman's Island* *Five minutes out for air at Albany* *Final effluent cascade wier at Ley Creek, Syracuse*

This treatment was air flocculation. While half of the flow of sewage was being treated by the conventional activated sludge treatment with return sludge, the other half of the flow was subjected to plain aeration with no return sludge. Results on 24 weeks' operation indicate a slightly more turbid effluent from the secondary tank, but the removal of BOD. and suspended solids was even slightly better than obtained with activated sludge.

Air used in the activated sludge process was approximately 1.0 c.f. per gal. but in the air flocculation process the amount of air used was little more than half of that. Detention time in the air flocculation was approximately 3 hrs. The *volume* of sludge produced was only one fourth that produced in the activated sludge half of the plant but the total *weight* of sludge removed was more than that from the activated process.

By combining the effluents of the two processes before passing them through a final polishing magnetite filter, a final effluent equivalent to a trickling filter is obtained. Five hour aeration gave the best results.

The President Speaks

At each of the section meetings, the President of the Association, Dr. George E. Symons, spoke on Association affairs, pointing out the need for these section meetings to carry on the work of the association during the period of ODT restrictions as well as to carry on their own function of bringing the local groups together for an exchange of ideas.

Dr. Symons said he had hoped that during this year there would be two more sections formed but because of the difficulties of carrying on the work at the present time the actual formation of a Lower Hudson Section and a Southern Tier Section will have to wait until next year but that the spade work would be laid during the coming months.

Two activities of operators have suffered during these war years: The preparation of annual reports to compete for rating awards, and the conduction of research. Dr. Symons urged that operators make the effort to prepare these annual reports not only for the chance to win the coveted Rating Award cup but also because the preparation of the report actually aids the operator in understanding the operation of his plant.

Research and the activities of the research committee are generally at a standstill because of the lack of men in many plants, but Dr. Symons warned that unless research studies were undertaken again as the war draws to a close, the progress of sewage treatment would suffer a severe set-back. The type of study conducted by Mr. Mann at the Ley Creek plant is the type of work that can often be done in any plant and will be of great benefit to all operators.

As do all presidents, Dr. Symons mentioned the matter of association membership. While it is true that a large number of former members are now in the armed forces, that is no reason why present members should not make the effort to bring in new members, particularly from among those who are licensed operators in the state, but are not now and never have been members of the organization.

The president also urged that municipalities take advantage of the State Planning Commission offer to pay for a part of the cost of planning, and that managers of sewage plants should be looking toward the carrying out of the long deferred maintenance in order

Kentucky Regional Meeting of Ky.-Tenn. Section of AWWA

The above group represent the Kentucky Regional Meeting of the Ky.-Tenn. section of AWWA, held at the University of Kentucky in Lexington, June 4 and 5, and constituting the first meeting of water works men in Kentucky since Pearl Harbor.

The feature of the meeting was the series of panel discussions under the leadership of E. E. Jacobson, Clark J. Cramer and W. H. Lovejoy, each heading up discussion panels of five men each. (Our error—on one panel there was Miss Lois Sutherland, Supt. at Paducah, Ky., and four men.)

The meeting was especially successful in that the panel discussion system brought forth much of interest in war practices; what has been learned through wartime operating experience; post-war problems and plans. Operators were given ample opportunity to ask questions freely and air their specific problems on which advice was forthcoming from "experts" comprising the several panels.

Some of the topics discussed were—"Hiring and Training New Employees"; "Employee Return from Armed Services"; "Experiences With Wartime Substitute Materials"; "Maintenance of Elevated Tanks"; "Automatic Uses"; "Maintenance and Operation of Pumping Equipment"; "Metal Spraying"; "Protection of Motors and Electrical Control Equipment"; "Filter Maintenance and Washing"; "Tastes and Odors"; "Cross Connections and Extent of Water Utility Responsibility for Conditions on the Customer's Property".

THE COMPILER WRITES HIS LOG

By BEN BARTON
Chief Operator
FINDLAY, OHIO

As an operator we kept a daily log, and we know many another operator who keeps a daily log of operation, but after reading the annual report of the Findlay Ohio Sewage Treatment Plant, we believe Ben Barton's Book will stack up against any other log for terseness, completeness, and expressiveness. So good do we think it is that we are reproducing several excerpts therefrom. If you can't just be in that plant as you read, then we've missed our guess.—G. E. S.

January

11—Wheelbarrow loaned last November returned with a new coat of paint, (as interest no doubt).

17—Colored caustic wastes, too numerous to mention, coming down.

19—Replaced knives with hammers in garbage grinder; seasonal routine for frozen garbage.

25—Lima operator brought over sludge sample for examination.

Our opinion confirmed by commercial laboratory analysis. Why don't we have more confidence in ourselves? We might have gotten the 35 bucks.

February

3—Broken underdrain tile in outdoor bed No. 8 let overflow back into sewage.

10—Electric Co. employee lost meerschaum pipe and pouch in toilet.

15—After 11 years got all cross-connections eliminated in the pump room.

18—Grinder peddler, Sam Tolman, here for garbage data.

March

5—Digester overflow discharge line to lagoon, frozen first time this winter.

10—Vacuum pump solenoid valve coil burned out.

27—To satisfy curiosity as to what goes on within the aeration tanks, sampling cocks were installed in the 8-in. drain lines.

Daily samples have been taken from each pass of each tank since, and the data are accumulating to tie in with operating results, particularly with the Findlay system of "adjusted-aeration" or stabilized-detention. Nothing momentous is expected but a lot of hitherto mysterious happenings are becoming explainable, if not yet completely understandable. Previously all samples were taken at the top; we are now "getting at the bottom of things," which seem somewhat different.

30—Wrong type of solenoid coils received for vacuum pump switches.

April

11—Spring floods. Pumping ground garbage into river.

25—Screens up at windows. Housecleaning time. Washing walls.

27—First power mower breakdown of the season.

28—Buying feed for 5 ducks for final tank cleaning this summer.

May

2—Gas engine reassembled with what new parts are available. Now running with some old parts that need replacement.

16—Sewage value increased by one diamond ring.

25—Iris bloom to high school for graduation decorations, (all they had) 7 huge bouquets of mother of pearl fragrance filled the auditorium. Walnut seedlings set out.

30—Red-oak seedlings set out. The monthly sheets show many caustic receipts, much gas wasting, and blowing of digester seal.

June

2—Thunderstorms mean power outages.

14—Stoppage at high point of gas line from digester dome caused by dry, lumpy powder, which ignited spontaneously. Believed to be phosphine.

19—First conference with consulting engineers on plant needs. Helper off sick.

26—Another helper off sick.

28—Launched ducks in final tank for the summer.

30—Juvenile "marines" digging foxholes in river bank beyond safe limits. Eventually took police force to make them see the error of their industrious play. Tunnel was 20 ft. deep.

July

1—Black sewage is now being received from unknown sources.

2—Green sewage, something new in colors.

10—Oily waste coming in past three days. Started feeding copper sulfate in primary effluent.

12—Nineteenth day without rain. Got 0.97-in. from 10 a. m. to 2 p. m. Considerable foam on aeration tanks; carbon dioxide?

25—Hippuric acid odor in pipe gallery and primary effluent.

August

1—A rat caught in detritor organic-return-impeller gears, was killed and the thermal fuse link blown.

3—Received a portion of engine repair ordered March 7th.

7—Primary tanks gassing furiously.

22—Service Director received complaint on lagoon odors. NWO (Northwestern Ohio) conference at Lima. Carey boys visited enroute.

28—Operator Hagerman quit. Bud was the originator of the Ohio area conference meetings in 1937. His quitting was instrumental in getting a general wage increase on Sept. 1st.

September

11—A local road contractor lost 10,000 gal. of "chip-tar" into sewer system. Diverted sewage carrying tar to river flat by sand-bagging the Northwest St. regulator inlet. Tar plugs bar screens completely.

12—The guilty contractor furnished three men to dip tar off the water surface in the wet wells. Six truck loads hauled to dump.

Careful manipulation of pumps required to keep water level at proper elevation to permit skimming.

13—Sewage turned back into plant.

19—Initiating a new operator helper (a 4-F).

24—Two hours and 42 minutes of power outage caused by a transport truck breaking a transmission pole line . . . Most such things happen on Sunday.

27—Add one woman's purse to sewer valuation.

October

1—Accepted 16 cases of dry soup mix as garbage. Wormy.

9—Consulting Engineer Jones here.

10—Consulting Engineer Henry here.

23—Flushed rats out of holes with hose. Killed 6 out of 7 seen. Found two dead in final tank.

29—Gears stripped in raw sewage meter clock.

November

6—Rescued a duck with its head stuck in 2½-in. pipe drawoff from final tank flume for Rawson Park skating water. Apparently suction drew duck's head into pipe while it was fulfilling its life duty of squeegeeing the flume bottom, and it seems a duck has little power in reverse.

11—Carp leaping from river water onto outfall apron. Hundreds crowding into plant outfall stream seeking dissolved oxygen.

13—Seems earthquake reported at 6:50 a. m. may have shifted a section of the concrete walk about ⅝-in.

17—Hunting season opens: score; Askam, 0; Bish, 4 rabbits; Bowman, 0; Mull, 1 flat tire. Compiler abstains.

17—Closed books on ducks for year. Cost $2.83 for work equal to 4-man hours per day and discounting plant entertainment.

21—Operator sick. Compiler works on grave yard shift.

December

11—Green caustic waste carries through the plant.

26—Impeller in detritor organic return slipped off.

31—It's been a hard year to keep things going. At year's end no space available for digester overflow solids or drawn sludge. 1945 looks tougher.

(Referring back to our introductory comment, we can only say, "See what we mean?" G. E. S.)

MOSQUITO CONTROL*

By R. B. JACKSON
Plant Engr.
SEWAGE TREATMENT PLANT
JACKSON, MICH.

MOSQUITOES like all insects belonging to the order Diptera, or two-winged flies, pass through four distinct stages of development: egg, larva, pupa, and adult. The egg in most cases is laid on the surface of still water, where it floats. The larva hatches from it, and the pupal or third stage swims about. The adult or winged form is the stage in which the mosquito is best known. The females alone "sing" and bite.

The Author

The mouthparts of the female mosquitoes are constructed for piercing and the sucking of blood from animals. There seems to be quite a wide range of variation as to the choice of blood preferred by the various species. In other words, some species attack mammals, others prefer birds and reptiles. No one species, as far as known, restricts its diet to human blood alone. The mouthparts of the males are not constructed for piercing, and the males are, therefore, unable to feed on the blood of animals. They feed on the juices of plants and on the nectar of flowers.

Breeding Places

Mosquitoes, as a group, utilize breeding places of the most diverse character. Most of the species, however, have general breeding places and their larvae will live in almost any chance accumulation of water, such as tin cans, bottles or any receptacle in which water can accumulate. Certain forms breed only in holes in trees, others in accumulation of water in plants.

Another species, frequently very annoying, breeds only in permanent swamps, where the larvae lives attached to the roots of some particular aquatic plants. It is therefore apparent that any mosquito control program to be effective is centered around still water. It is necessary to locate and either treat or drain all breeding places before May 1st and to continue this campaign into September. Each locality presents its own individual problem and while the same general principles apply, they must be varied to meet local conditions. The drainage of stagnant pools and marshes, tiling to prevent the overflow of low lands in early spring, straightening of river banks to prevent pockets of still water, dredging streams or drainage ditches to create a current, or even opening up the banks of lakes so that the wind may roughen the surface, are common practices in mosquito control.

Choice of Treatment

While it is obviously best to abolish breeding places, it often happens that it is not possible to drain them and, as a temporary expedient at least, it becomes desirable to treat the water to kill the mosquito larvae. Many substances have been tried and, aside from certain proprietary mixtures, nothing has given such good results as oils. Efforts to find oils that can be used to better advantage than petroleum have failed. Because of its general availability and low cost, ordinary low-grade kerosene is very satisfactory. For extensive oiling operations, however, one of the petroleum distillate fuel oils, known also as gas oils, is preferable.

In choosing the grade of oil, two factors are to be considered: (1) It should spread rapidly; (2) It should not evaporate too quickly. The heavier grades of oil will not spread readily over the surface of the water but will cling together in spots and the coating will be unnecessarily thick. The rapidity with which the film spreads is also important. If the water is still, an ounce of kerosene to 15 square feet of surface space is about the right proportion and in the absence of wind such a film will remain persistent for 10 days or slightly longer. Even after the iridescence apparently disappears there is still an odor of kerosene about the water. Wind will frequently blow the film of kerosene to one side but a change of wind will blow it back again, so the larvae are destroyed. Not only are larvae and pupae destroyed by the kerosene film but many adult mosquitoes alighting on the surface of the water to drink or to lay eggs are killed by it.

Special Sprays

Under certain conditions, however, there is some objection to the use of the colored petroleum oils and to kerosene because of injury to vegetation or water fowls, and unsightliness. In this connection mention should be made of the pyrethrum mosquito larvicide developed by workers of the New Jersey Experiment Station, which appears to be admirably suited for use wherever oil is objectionable. This larvicide is made up to contain 66 per cent kerosene, or a similar light petroleum oil, containing pyrethrum extract (equivalent to 1 pound of pyrethrum flowers to the gallon of oil) and 34 per cent of water containing from 3 to 5 per cent of soft soap. The ingredients are thoroughly mixed by violent agitation. The best way to make this emulsion is to pour the soap into the water and agitate until a heavy foam is formed. Combine the oil with pyrethrum, then pour into the soap and water, agitate for at least 30 minutes. The result of this is a concentrated emulsion which mixes readily with water. For use in killing mosquito larvae and pupae, dilute this stock emulsion using 1 part stock emulsion in 12 parts of water and spray it on the mosquito breeding area at the rate of about 25 gallons per acre.

A spray can be used. It can be sprinkled with an ordinary watering pot with a rose nozzle, or pouring the liquid out of a dipper or cup will be satisfactory. In larger areas, pumps with straight nozzles may be used. A straight stream will sink and then rise and spread until the whole surface is covered without any waste.

It has been found that Paris Green of standard quality, mixed with fine dust and blown as powder over the surface of water, will kill the top-feeding larvae of mosquitoes. Paris Green is mixed with road dust, Fuller's earth, powdered soapstone, or something of the sort in about 10 per cent by weight of Paris Green. This dust may be distributed over breeding waters in many ways. A very convenient and effective distribution over comparatively small bodies of

*Presented before the Mich. Sew. Wks. Assn., and released to *Water Works & Sewerage* by the Federation of Sewage Works Associations.

water may be made from a boat by hand. The effective quantity of Paris Green was found to be about one pound per acre. It has been shown that Paris Green may be mixed with moist sand and, put below the water surface, will kill the larvae that feed below the surface.

Control By Fish

The common goldfish and sunfish, or any surface feeding fish, destroy mosquito larvae and should be put in artificial ponds and ornamental pools. Also top minnows of several species have been introduced successfully in several localities and are great feeders upon mosquito larvae. The effectiveness of fish may be increased by clearing the water of any vegetation or debris which will prevent the fish from free access to all parts.

Mosquitoes' eggs hatch and the insects mature only in still water; but eggs may remain on mud or elsewhere for years ready to hatch when water is supplied. The mosquito does not die after "stinging" but, unless killed, flies off to other victims or may return to the same one again and again.

In summary it may be said that sources of mosquitoes may be controlled by natural methods, as by promoting free flow of water through a stream, draining a swamp or providing fish that destroy the mosquito in any of its stages; or they may be controlled by artificial, man-operated methods, such as spraying oil or the more modern pyrethrum larvacides on standing water that cannot be gotten rid of; or by preventing the accumulation of any kind of container that will hold a few inches of water for a week or more.

References:

Michigan State College, Circular Bulletin No. 144, Aug., 1932.

Michigan State College, The Quarterly Bulletin, Aug., 1939.

U. S. Dept. of Agriculture, Farmer's Bulletin No. 1570.

The American Home, July, 1940.

The Saturday Evening Post, Sept. 12, 1942.

A Governor Issues Proclamation for Stream Improvement Week

STATE OF INDIANA

EXECUTIVE DEPARTMENT

INDIANAPOLIS

TO ALL TO WHOM THESE PRESENTS MAY COME, GREETING:

WHEREAS, I feel there is a great need for the cleansing of Indiana's streams, rivers, our lakes, and also for the enlightening and arousing of interest among our citizens of Indiana toward the enlightenment of this part, and

WHEREAS, the Ohio Indiana river system is the largest human in stream pollution control with only 18.7% of our urban population being served with sewage treatment, and

WHEREAS, I feel perhaps this bad showing on the part of our State toward protecting these beautiful natural resources which we have inherited, might be due to our failure to appreciate their importance to the economic welfare of our State, and might be due to the apathy of all of us, and

WHEREAS, the condition of these waterways is really worse during the hot summer months and the period usually referred to as dog days,

THEREFORE, I, Ralph F. Gates, Governor of Indiana do hereby proclaim the week of

AUGUST 13TH

TO

AUGUST 20TH

STREAM IMPROVEMENT WEEK

in Indiana, and urge all our fine civic clubs, chambers of commerce, women's organizations, sportsmen's clubs, conservation clubs, newspapers, radios, municipal and industrial leaders, to use their influence to help change this attitude of apathy to one of action. I think this is a serious challenge to all to help bring about the stopping of the pollution of our streams, and I feel certain, that through this concerted action, we may expect our great State to achieve its proper standing in the Nation, and to make the health of its people greatly improved.

IN TESTIMONY WHEREOF, I HAVE HEREUNTO SET MY HAND AND CAUSED TO BE AFFIXED THE GREAT SEAL OF THE STATE OF INDIANA, AT THE CAPITOL, IN THE CITY OF INDIANAPOLIS, THIS DAY OF

Ralph F. Gates

BY THE GOVERNOR:

Unique Method of Making Indiana Citizens and Industry Stream Pollution Conscious.

Proclamation of Ralph F. Gates, Governor of Indiana, setting aside Aug. 13 to Aug. 20 as Stream Improvement Week in Indiana, and urging all civic clubs, chambers of commerce, women's organizations, sportsmen's clubs, conservation clubs, newspapers, radios, municipal and industrial leaders, to use their influence to help change an attitude of apathy to one of action.

Governor Gates issued this unique proclamation as "a challenge to all" to help bring about the stopping of the pollution of Indiana's streams and improve the health of her citizens.

"Pre-historic"?

This strange looking specimen has the appearance of being the remains of the great granddaddy of the Cyclops. It is to be found on the watershed of Greenville, S. C.

Now, if the lover of things less strange and more beautiful will make a closer inspection of this natural curiosity by turning the page 90 degrees to the right, he will have a mirrored view of Table Rock Mountain across Greenville's reservoir of the same name.

Interestingly, the reflected view of the mountain is sharper than the true view. But turn it 90 degrees to the left also and take your choice.

[Ed: Note: Was our face red when we thumbed through the May issue to find that what was intended as a little play on the theme that "things aren't always as they seem" had come through a *complete* flop. We are repeating the item "Pre-historic" with the cut in the position which was intended originally. Those who saw this item in May must have done some strange thinking when trying to tie in the copy with the picture. To begin with, the engraving was an inferior one and detail was lost; more important, the cut had already been turned the 90 degrees. Now it looks a bit different, doesn't it? Oh well,

with the situation what it is in Chicago, we fully expect someday to find that the covers have been put on up-side down.]

AWWA's "Golden Voice" on the Mend

Clinton Inglee, President and Gen'l. Manager of National Water Main Cleaning Co., member of the Executive Committee of AWWA and member of the W. & S. Mfgrs. Ass'n. Board of Governors, best known perhaps to the greatest number as the "Golden Voice of AWWA," and chairman of its Convention Entertainment Committee, we are happy to report is "on the mend" after a hazardous major operation. He has left the hospital and is now enjoying the sunshine in his Amityville, Long Island, ancestral gardens from a wheel-chair

Well, we are happy to report to his many friends that "Clint" has proved that he could take it, and is coming along now in great shape.

Brother "Clint" got the idea that he could lift a sail-boat around like he once did, forgetting that he's long since become a "grandpappy", regardless of how he puts across Irish melodies or leads AWWA conventioneers in the song "I'll Never Grow Too Old to Dream", or how young his mirror tells him he is.

DESIGN OF CONTROL FLUMES FOR GRIT CHAMBERS

Simple Aid for Use with the Bushee Method

By
W. E. HOWLAND
Prof. of Sanitary Engineering
PURDUE UNIVERSITY
LAFAYETTE, IND.

IN an article entitled "An Improved Method of Velocity Control in Grit Chambers" by R. J. Bushee, published in *Water Works and Sewerage*, December 1941, page 561, the use of the Venturi flume for this purpose is suggested, and a satisfactory graphical method of design is fully described.

Herein are offered without derivation (1) a formula which shows conveniently the departures from a standard velocity of one foot per second that may be expected with this device designed to accommodate various flows and (2) other formulas which may be used in place of the graphical method for design, thus greatly simplifying the procedure. A chart is also given which makes unnecessary the use of the more complicated of the accompanying formulas.

The accompanying figure shows the cross-section of a rectangular grit chamber of depth D and width W, and also the cross-section of the control flume of height H (somewhat greater than D) and width W. Mr. Bushee shows in his original article how one may design the control device for a rectangular cross-section and then revise the shape of the bottom of the grit chamber, giving it an equivalent cross-section area. In this article such a revision of the shape will not be considered, but of course it could easily be made.

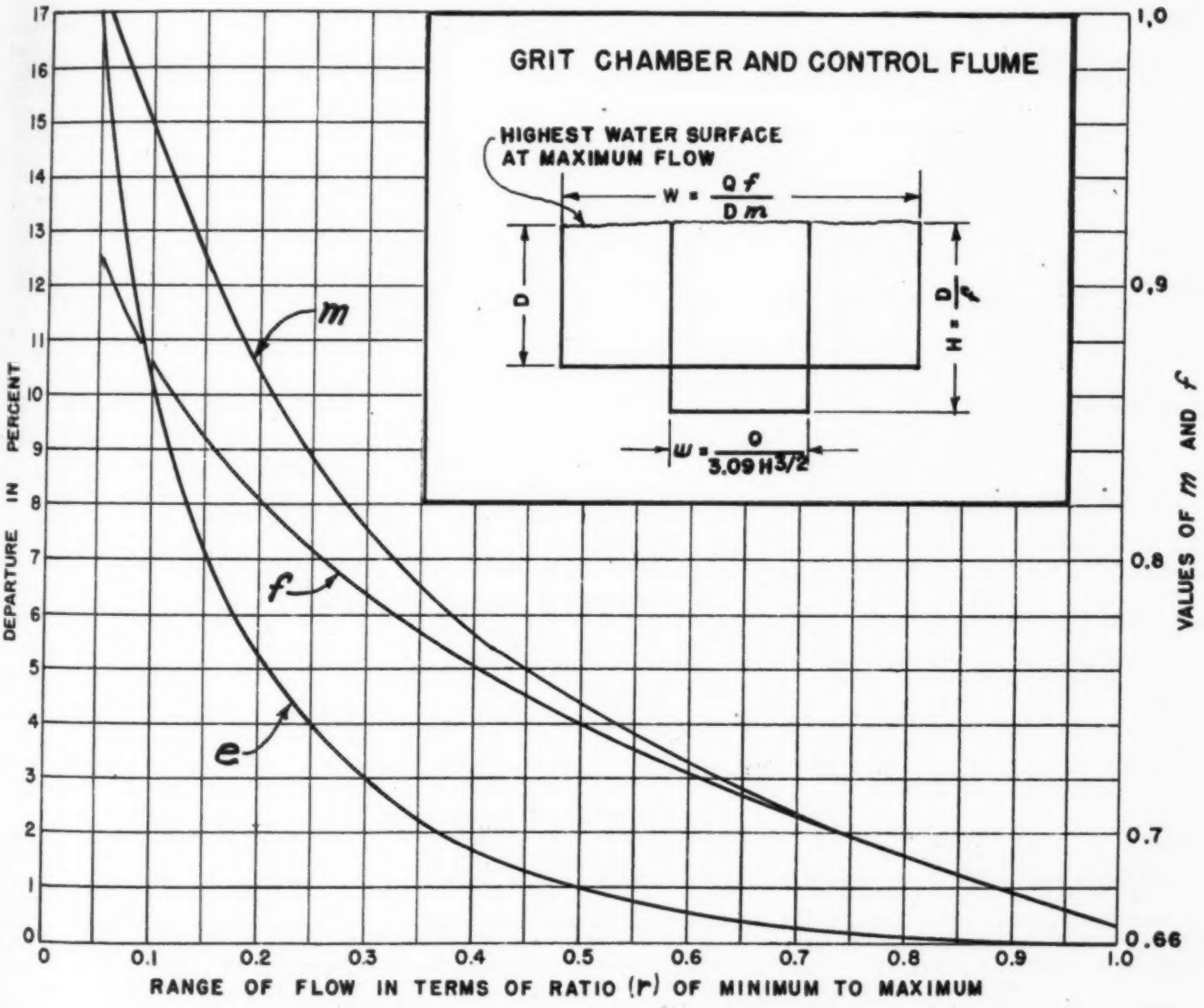


Chart for Aid in Design of Control Flumes for Grit Chambers.
(For Use with Bushee Method—Water Works & Sewerage, p. 561, 1941)

The figure also shows the maximum departure, e, from the velocity of one foot per second which may be expected when the flume is designed to accommodate various ratios, called r, of minimum to maximum flows. For example, it appears from this chart that when the minimum flow is one tenth of the maximum flow, then the maximum departure from velocity of one foot per second will be 10 per cent, or 0.1 foot per second, and when the minimum flow is three tenths of the maximum flow the maximum departure from the velocity of one foot per second is 3 per cent, or 0.03 feet per second.

The values of m and of f against r, the ratio of maximum to minimum flows are plotted in the figure herewith. These quantities are ratios which appear in the design formulas. The use of this chart avoids rather cumbersome computations.

Notations in Formulas

In order to present the formulas it is first necessary to explain the notation:

W = Width of rectangular (or equivalent rectangular) grit chamber, in feet.

D = Maximum depth of rectangular (or equivalent rectangular) grit chamber, in feet.

w = Width of Venturi flume, in feet.

H = Maximum depth or head on Venturi flume, in feet.

Q = Maximum rate of flow to be provided for in grit chamber, in cubic feet per second.

r = Ratio of minimum to maximum flow to be provided for in grit chamber, the abcissa of all curves shown on the accompanying chart.

f = Ratio of D to H—a number appearing in formula I and plotted on the graph.

m = An abstract number defined by the second equation below.

e = Maximum departure from a velocity of one foot per second, either in feet per second or as a fraction, plotted in the accompanying figure.

*The Formulas Involved**

I. $$f = \frac{(1-r^{2/3})}{(1-r)}$$

II. $$m = \frac{2}{\frac{1}{f} + 2.598\,(1-f^{1/2})}$$

III. $$e = \frac{m}{f} - 1$$

IV. $$H = \frac{D}{f}$$

V. $$w = \frac{Q}{3.09\ H^{3/2}}$$

VI. $$W = \frac{Qf}{D_m} = \frac{Q}{H_m}$$

*(Upon request the writer will supply a mimeographed copy of his derivations of these formulas.)

The validity of these formulas may easily be tested by application to particular examples.

Illustrative Example:

Assume that Q = 6.2 cu. ft. per sec.
D = 1.8 ft.
r = .3 (i.e. minimum flow is 1.86 cu. ft. per sec.)

Then by I, or from curve, f = .789 and
by IV, H = 2.28 ft.
by V w = .582 ft.
By II, or from curve, m = .811;
by VI, W = 3.34 ft.
By III, or from curve, e = .03 ft./sec. or 3%.

Actual computations show that when Q = 6.2 cu. ft. per sec., or when the minimum flow is 1.86 cu. ft. per sec. v = 1.03 ft./sec. But when the flow is 3.11 cu. ft. per sec., then v is 0.97 ft./sec. This is the minimum velocity attained at any flow between 6.2 and 1.86 cu. ft. per sec. Thus the expected departure (3 per cent) is confirmed.

The formulas given have been based on the following conditions: (1) that the maximum positive departure from a velocity of 1 ft. per sec. which occurs at the maximum flow shall be exactly equal to the maximum positive departure from a volume of 1 ft. per sec. which will occur at the minimum flow, and (2) that this maximum positive departure from a velocity of 1 ft. per sec. shall exactly equal the maximum negative departure from a velocity of 1 ft. per sec. which will occur at an intermediate flow.

It's I.M. Glace and Associates, Now!

It was only a small card of the business announcement variety, but it told a story, perhaps two stories: it read "I. M. Glace and Associates, Consulting Sanitary Engineers, announce new office location at 1001 North Front St. in Harrisburg, Penna."

One story behind this announcement is the well deserved expansion of a firm of sanitary engineers, for it formerly was I. M. Glace at 22nd and Market Sts. With the expansion of the firm and new quarters, even better engineering service is now afforded to the area.

The other story lies in the small type at the bottom of the card where it lists an office phone and a "Night or Emergency Phone". "Mike" Glace and his associates are not the type of fellows who consider it a day when the five o'clock whistle blows. If an emergency arises in any plant in that area expert advice and help is to be had even in the middle of a dark and stormy night.—And, that's when a fellow may need it most! Service with a capital "S" we would call it.

L. G. Williams and B. H. Swab Join Jones and Henry

Jones and Henry, formerly H. P. Jones & Co., of Toledo, have added two engineers of experience to their staff.

Bernal H. Swab, a graduate of Purdue University was previously associated with the Sanitary District of Indianapolis and Chicago, Greeley and Hansen of Chicago, and William C. Olsen, of Raleigh, N. C., and was one time city engineer of Altoona, Pa.

The other engineer to become associated with Jones and Henry is Leon G. "Bill" Williams, for sixteen years on the staff of Greeley and Hansen. William's latest assignment was that of resident representative on the Hampton Roads Water and Sewerage Projects.

Chicago's Huge Water Purification Plant Expected to Begin Operation in July

Although Chicago has been unable to equip the filters in its huge new 320 mgd. Filtration Plant, which will be the "World's Largest" and cost $23,000,000 to complete, it is expected to begin purifying water during July. The sometimes very objectionable lake water will at least be given high degree flocculation and clarification, without benefit of the polishing off through the filters which W.P.B. has not yet considered sufficiently essential to grant critical materials for the completion thereof.

The Silicate Process of Coagulation, developed by John R. Baylis for Chicago is to be employed. In this process the floc forms pellet-like masses which are extremely tough and fall out more like buck-shot than ordinary alum floc. Therefore a high degree of purification is expected from flocculation and subsidence alone. Possibly some day we will be using nothing more than gunnysacks as filters—who knows?

A REQUIREMENT *for* OVERALL EFFICIENCY *of* ACTIVATED SLUDGE PLANTS

Chicago Wide Band Air Diffusion System with Swing Diffusers at Omaha, Nebr., sewage treatment plant.

SUCCESSFUL PERFORMANCE ASSURED BY 10 YEARS EXPERIENCE OVER 150 INSTALLATIONS

OPERATION EFFICIENCY: Swing Diffusers can be raised to tank walk and tubes removed for cleaning without interrupting operation of the aeration tank. Tubes can be cleaned a few at a time by a small labor force as fill-in work. It is not necessary to dewater the tank and clean all tubes at one time. Clogging by organic growths can, in many cases, be prevented by raising Swing Diffuser and hosing the tubes.

AERATION EFFICIENCY: Chicago Wide Band Air Diffusion System with Swing Diffusers* provides greater oxygen absorption — eliminates center coring — less air for optimum circulation — power economy through reduced hydrostatic head on elevated diffuser tubes — simple rearrangement of diffuser tube spacing to conform with oxygen demand.

*Patented

CHICAGO PUMP COMPANY

SEWAGE EQUIPMENT DIVISION

2349 WOLFRAM STREET — **CHICAGO 18, ILLINOIS**

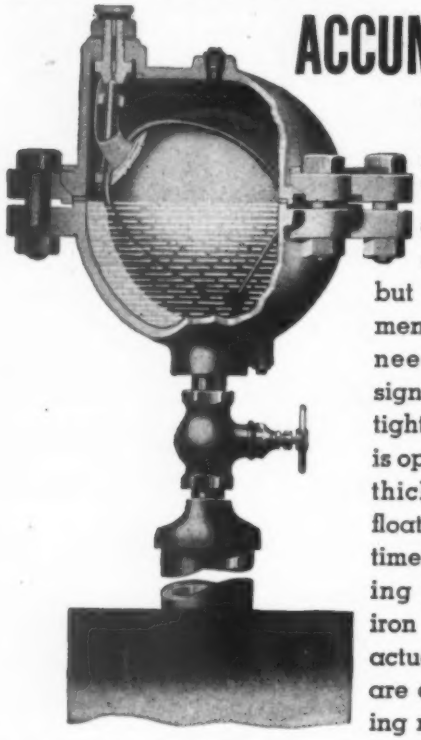
Flush Kleen, Scru-Peller, Plunger, Horizontal and Vertical Non-Clogs, Water Seal Pumping Units, Samplers.

Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

IS *AIR SABOTAGING* YOUR PIPE LINES AND PUMPS?

If not removed, air entrained in a liquid or entering the system through leaky joints and pump suctions, may result in serious damage to the pipe line and to the pumping equipment. These air obstructions not only reduce the operating head, but the area of discharge is considerably reduced or entirely cut off.

SIMPLEX AIR RELEASE VALVES AUTOMATICALLY VENT AIR ACCUMULATIONS



THE Simplex Automatic Air Release Valve is of simple, dependable construction, having but one lever movement which operates a needle valve so designed as to be always tight seating. The valve is operated by a heavy thickness glass ball float, tested to several times the service working pressure. A cast iron shell houses the actuating parts which are of corrosion resisting materials.

Standard Simplex Air Release Valve is for working pressures up to 250 lbs. per square inch. The Type "ARA" valve is similar in design but operates up to 1250 lbs. per square inch. Simplex Air Release Valves are being used extensively on lines and pumps for the release of air in water and sewage lines, oil and gasoline lines, and for industrial process liquids.

Write today for further information on the Simplex Air Release Valve — the automatic watchdog to assure continuous peak flow.

SIMPLEX VALVE & METER COMPANY

6743 Upland Street • Philadelphia, Pennsylvania

MEETINGS SCHEDULED

IMPORTANT

Meetings, conferences, short schools, which will require hotel rooms or sleeping car accommodations for no more than 50 persons are considered as local or sectional meetings, and a permit from the Federal War Committee on Conventions to hold such meetings is not required. Therefore many conferences and short schools can be held without filing an application.

July 25—RED BANK, N. J. (Molly Pitcher Restaurant)
New Jersey Section A.W.W.A. (Monmouth County Regional Conference). Sec'y, C. B. Tygert, Box 178, Newark 1, N. J.

July 26-28—GAINESVILLE, FLA. (University of Florida)
Florida Water and Sewage Treatment Short Course. Director of School, J. B. Miller, Chief San. Engr., Florida State Board of Health, Jacksonville, Fla.

Aug. 8—NORTHEAST HARBOR, ME.
Maine Water Utilities Association. Sec'y, Earle A. Tarr, Supt. Water District, Winthrop, Me. (Next meeting Oct. 10, at Bath, Me.)

Federation of Sewage Works Ass'ns
(Annual Conference Indefinitely Postponed)

The Federation's Annual Conference, planned for Toronto in September, has been postponed for an indefinite period. However, the Federation's Board of Control will hold its annual business meeting on Oct. 17 and 18, at some centrally located point, to be announced.

Sept. 12—SPRINGFIELD, MASS. (Hotel Kimball)
New England Sewage Works Association. Sec'y-Treas., LeRoy W. VanKleeck, State Department of Health, Hartford, Conn.

Sept. 12-13—FLINT, MICH.
Michigan Section, A.W.W.A. Sec'y-Treas., R. J. Faust, Chief, Div. of Water, State Department of Health, Lansing 4, Mich.

*Sept. 14—PITTSBURGH, PA. (Roosevelt Hotel)
Western Pennsylvania Section A.W.W.A. Sec'y-Treas., E. P. Johnson, 418 Flannery Bldg., Pittsburgh 13, Pa.
(Joint Meeting with)
Pennsylvania Water Works Operators Association. Sec'y, I. M. Glace, 22 South 22nd Street, Harrisburg, Pa.

*Sept. 19-20—GRAND RAPIDS, MICH.
Michigan Section A.W.W.A. Sec'y-Treas., M. H. Gerardy, Dept. of Water, Water Board Bldg., Detroit 26, Mich.

Oct. 6—PAINTED POST, N. Y.
Tri County Water Association (Semi-Annual Meeting). Chairman, E. J. Rowe, 110 Maple Ave., Wellsville, N. Y.

*Oct. 15-17—(Meeting place announced later)
Southwest Section A.W.W.A. Sec'y-Treas., L. A. Jackson, Gen'l Mgr., Water Dept., Little Rock, Ark.

Oct. 22-23—PITTSBURGH, PA. (Hotel Wm. Penn)
Engineers Society of Western Pennsylvania. Chairman, H. M. Olson, 171 Longvue Drive, Mt. Lebanon, Pa.

*Oct. 23—LOS ANGELES, CALIF.
Oct. 25—SAN FRANCISCO, CALIF.
California Section A.W.W.A. Sec'y.-Treas., B. I. Burnson, Box 720, Oakland 4, Calif.

*Oct. 30-31—MILWAUKEE, WIS. (Pfister Hotel)
Wisconsin Section A.W.W.A. Sec'y-Treas., Leon A. Smith, Supt. Water Works, City Hall, Madison, Wis.

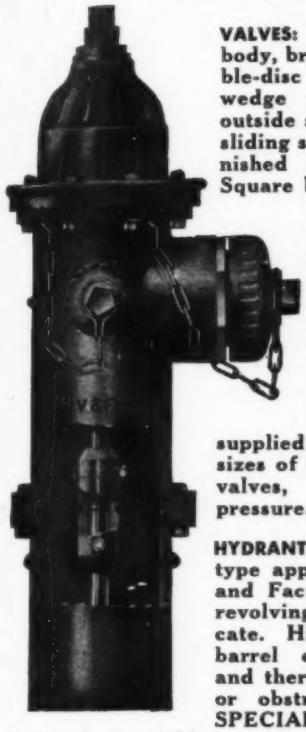
*Nov. 5-7—CHARLOTTE, N. C. (Hotel Charlotte)
North Carolina Section A.W.W.A. Sec'y, D. M. Williams, Supt. of Water & Sewerage, Durham, N. C.

*Nov. 8-9—ROANOKE, VA.
Virginia Section A.W.W.A. Sec'y-Treas., W. H. Shewbridge, State Health Dept., 1506 Greycourt Ave., Richmond 22, Va.

*ED. NOTE: A.W.W.A. Section Meetings here listed for fall dates are scheduled contingent upon the attitude of the War Committee on Conventions later in the year.

Dependable!
Rugged!

VALVES
HYDRANTS



VALVES: A.W.W.A. type, iron body, bronze mounted with double-disc parallel seat or solid wedge type. Non-rising stem, outside screw and yoke, or with sliding stem and lever. Also furnished hydraulically operated. Square bottom type operates in any position. All rugged and dependable, made of best material with highest quality workmanship.

Hydraulically Operated: For remote control of operation and for quicker, easier opening or closing. Can be supplied in any of the standard sizes of M & H A.W.W.A. gate valves, either high or low pressure.

HYDRANTS: Standard A.W.W.A. type approved by Underwriters and Factory Mutuals. Dry top, revolving head, easy to lubricate. High efficiency because barrel diameter not reduced and there are no working parts or obstructions in waterway. SPECIAL TRAFFIC MODEL is designed to yield at ground line under impact, repair being simply renewal of breakable bolts and breakable coupling on stem.

Write for Catalog No. 34

M & H PRODUCTS INCLUDE

FIRE HYDRANTS
GATE VALVES
TAPPING VALVES
WALL CASTINGS
SPECIAL CASTINGS
TAPPING SLEEVES
CHECK VALVES
FLOOR STANDS
EXTENSION STEMS
SHEAR GATES
MUD VALVES
VALVE BOXES
FLAP VALVES
SLUDGE SHOES
FLANGE AND FLARE FITTINGS
FLANGED FITTINGS
B & S FITTINGS
CUTTING-IN TEES

M & H VALVE
AND FITTINGS COMPANY

ANNISTON, ALABAMA

PEERLESS PUMPS

Peerless

NOW MANUFACTURES

HORIZONTAL

AS WELL AS

VERTICAL

PUMPS

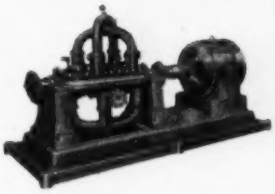
...WITH THE ACQUISITION OF

DAYTON-DOWD COMPANY

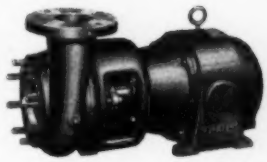
BY THE PEERLESS PUMP DIVISION

★ Complementing the eminent line of Peerless *Vertical* Turbine, Hi-Lift, Hydro-Foil, Jet and Water King Pumps, Peerless now manufactures *Horizontal* Centrifugal Pumps, formerly Dayton-Dowd.

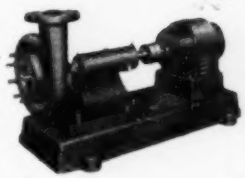
Peerless has acquired the Dayton-Dowd Company of Quincy, Illinois, which henceforth will be operated as the Quincy Works of Peerless Pump Division.



So now, regardless of the type of pump you need—Peerless produces it, giving you choice of *vertical* or *horizontal* design, plus augmented hydraulic engineering service.



Advise us as to the type of pump desired—whether vertical or horizontal—capacity and lift. We will be pleased to submit full specifications and engineering details.

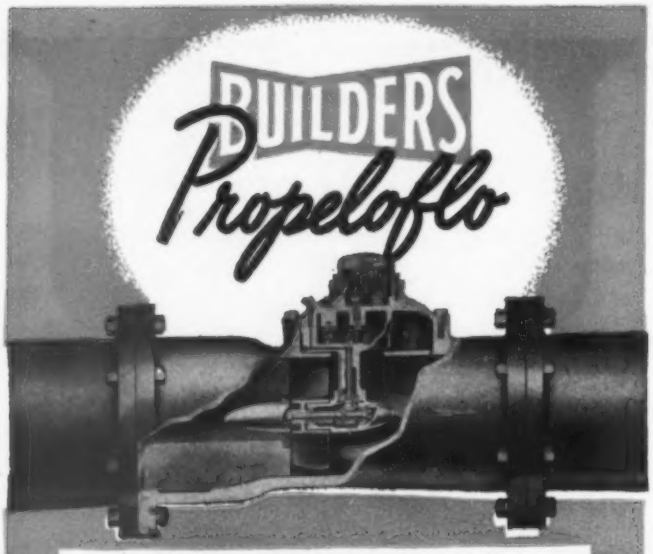


Peerless Pumps

VERTICAL & HORIZONTAL

PEERLESS PUMP DIVISION—*Food Machinery Corp.*

LOS ANGELES 31, CALIF. 301 W. Ave. 26 ★ QUINCY, ILLINOIS 2nd and York Sts. ★ CANTON 6, OHIO 1250 Camden Ave., S.W.



IMPROVED PROPELLER-TYPE FLOW METER FOR WATER

Streamline Venturi design gives exceptional accuracy through a wide range of flow with low loss of head. Simple to install; low first cost; low upkeep.

Send for Bulletin 350. Address Builders-Providence, Inc., (Division of Builders Iron Foundry), 10 Codding St., Providence 1, R. I.

Sincerely
BUILDERS-PROVIDENCE

ONE-WAY PASSAGE
TO DRAINAGE IN SEWERS

JOSAM FLAP VALVES

● ● ● Josam Flap Valves give *one-way passage* only to drainage. Flap closes tightly with slightest backflow, preventing backwater in sewer and water lines and in sewage disposal plants. Can be placed at manhole in sewer lines . . . between settling basins in sewage disposal plants. Also serves as a sluice, river, or tidewater outlet. Write for free booklet on Backwater Control.

JOSAM MANUFACTURING COMPANY

Executive Offices
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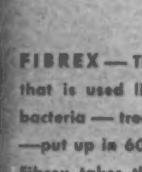
THERE ARE NO SUBSTITUTES FOR JOSAM PRODUCTS

HYDRO-TITE



HYDRO-TITE — The self-caulking joint compound that makes cast iron water pipe joints — strong — tight — flexible and everlasting. Used on thousands of miles of pipe with a record of more than 30 years without a failure.

FIBREX — The sanitary paper packing that is used like braided jute. Free from bacteria — treated with a water repellent — put up in 60 pound reels. 70 pounds of Fibrex takes the place of 100 pounds of braided jute.

HYDRAULIC DEVELOPMENT CORPORATION
50 Church St.
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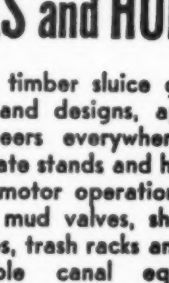
DRY BRAIDED
Fibrex

RODNEY HUNT



GATES and HOISTS

Metal or timber sluice gates of all sizes and designs, approved by engineers everywhere. Improved gate stands and hoists for hand or motor operation. Also flap and mud valves, shear and filler gates, trash racks and rakes. Dependable canal equipment from dam to tail-race since 1840.

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RODNEY HUNT MACHINE CO.
118 Lake St., Orange, Mass., U. S. A.

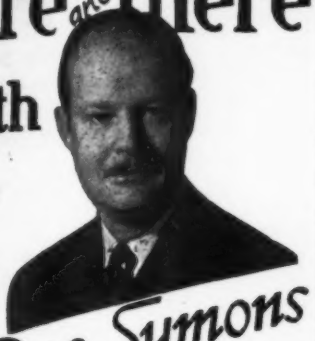
FORD 80 SERIES
COPPERSETTER

Convenient and durable meter mountings for riser settings in meter pits.

80 Series COPPERSETTERS are made with and without valves and for connecting to iron or copper pipe. They hold risers permanently braced and electrically bonded, making meter changes trouble-free. Ask for our catalog.

FORD METER BOX CO.
WABASH, IND.

Here and There with Doc Symons



Without an AWWA convention to attend this year, I'll have to be content to see Sam Morris' face and read his words in **Intake,** the Los Angeles Dept. of Water and Power Employees' magazine.

In the April issue, Sam B. Morris, now Gen. Mgr. and Chief Engineer of the Los Angeles Dept. of Water and Power, has written an editorial tribute to the late President. Eschewing any possible political implications, Mr. Morris wrote movingly of Mr. Roosevelt, but Mr. Morris also wrote of the importance of the future and the part of each of us in it, and these words of Sam Morris bear repeating.

"His work is finished, ours remains to be done. . . . It is the future not the past which is important. In the moulding of that future, the work of each of us is important. To each is allotted a share, humble or great, in the job of creating the better world of tomorrow. The little job and the big job are both essential. The thing that counts is recognition of individual responsibility, and sincere effort to discharge it well. The world watches and applauds only a few, but the work of each is a necessary contribution to the whole."

* * * *

Twenty-Second Quiz (from Monsanto's Magazine—Thanks to Jerry McCarthy): (1) When water is changed to steam its volume is increased by (a) 500 fold, (b) 780 fold, (c) 1300 fold, (d) 1700 fold?

(2) What is wetter than water?

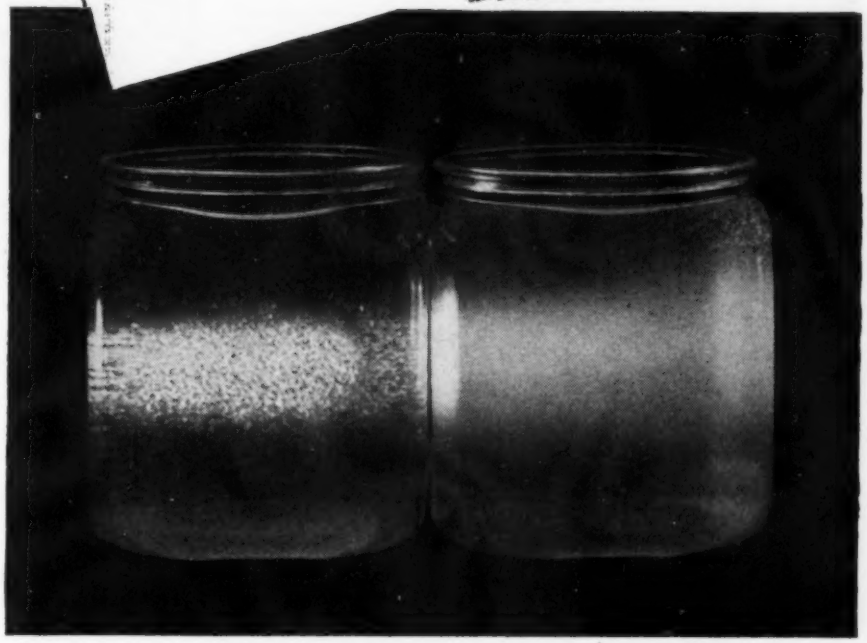
(3) How much heavier than water is heavy water, (a) twice, (b) one-quarter, (c) one-ninth, (d) one-twelfth?

See answers at end of column.

* * * *

At least one wife of a water works man really knows what a filter plant is. She is none other than Mrs. L. L. Hedgepeth, who started her

Design FOR SPARKLING CLEAR WATER BEGINS HERE



How N-Sol-A, made with N Brand Silicate, can increase the rate of growth of the floc is demonstrated in the above jars. Right jar, alum; left, alum and N-Sol-A. The floc is large, tough, and rapid-settling.

Improved quality of finished water is the reason why many plants have selected an N-Sol Process. In other cases, N-Sol has increased capacity through higher flow rates and longer filter runs, which permits the design of a smaller plant to fit specifications.

Before you complete your plan for a new filtration plant, ask for information about the four processes of treating water with activated silica. You'll also want the handy literature folder (#52-8) containing bulletins and reprints of technical articles, describing the use of N-Sol Processes. Free on request.

Four processes to fit any water treatment procedure — save space, save money.

N-Sol-A*—N Brand reacted with ammonium sulfate. Used where chloramine sterilization is desired.

N-Sol-B—N Brand reacted with alum. Used with any sterilization procedure. (U.S. Pat. No. 2,310,009)

N-Sol-C*—N Brand reacted with chlorine. Used with any chlorine sterilization.

Baylis Sol—N Brand reacted with sulphuric acid. Used with any sterilization procedure. (U.S. Pat. No. 2,217,466)

* Patent Applied For

N-SOL PROCESSES FOR WATER COAGULATION

DEVELOPED AND PATENTED BY
PHILADELPHIA QUARTZ COMPANY, PHILADELPHIA 6
AVAILABLE UNDER LICENSE WITHOUT CHARGE

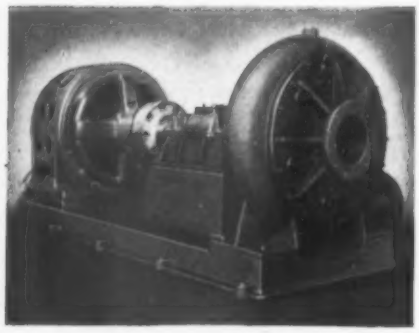
Adaptability to

GENERAL MUNICIPAL REQUIREMENTS

This **MORRIS**

HYDRAULIC CUTTER DREDGE

Has Demonstrated its Utility on Three Locations Handling Three Different Deposits* . . .



* 1. (near Chicago) production of heavy sand and gravel, delivering through approximately 1500′ of 12″ discharge line against a 30′ static discharge head. Used until deposit was exhausted.

2. (Mississippi River) dredging for locks and dams. Used until work was completed.

3. (Albert Lea, Minn.) A lake improvement project, moving 500,000 cu. yds. of mud, clay, sand and gravel through 12″ discharge lines up to 3500′ in length. Used for 7 months.

4. (Portland, Ore.) Now being set up for its fourth job.

Assembled, dismantled and moved overland 3 different times—for dredging jobs on 3 difficult deposits—the *Captain George*, a Morris 12″ portable hydraulic cutter dredge has proved both its versatility and its mobility . . . demonstrating again that Morris dredges are engineered with two ends in view:—

1. MAXIMUM OUTPUT through getting the maximum amount of solids into the pump at a uniform rate.

2. MAXIMUM LIFE with a reasonable and economical wear of all parts.

Morris cutters and pumps work in efficient combination and the operating gear, designed for flexibility and ease in manipulation, is reduced to the simplest practicable mechanics. The Captain George exemplifies a dredge that will cope with the most stubborn deposits—it is the dredge boat adapted to reservoir cleaning, filling low lands, draining low areas, park beautification and general postwar municipal projects.

Write for Special Bulletin 177 giving descriptions, specifications, and recommendations on hydraulic dredging plants.

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Branch Offices in Principal Cities

MORRIS **CENTRIFUGAL PUMPS**

married life with "Hedge" in the alum room of a filter plant. Yes sir, they moved the alum right out and moved their household goods right in so Hedge could really be on the job all the time. Maybe Hedge feels indebted to the alum and that's why he later took to selling better water coagulation.

* * * *

From *Newscript* in the News Edition of *Ind. and Engr. Chem.* comes an item entitled, "Why Editors Go Nuts Dep't." in which is quoted a letter asking where one can obtain the book entitled "Ibid.," which appears so often in references at the end of technical articles.

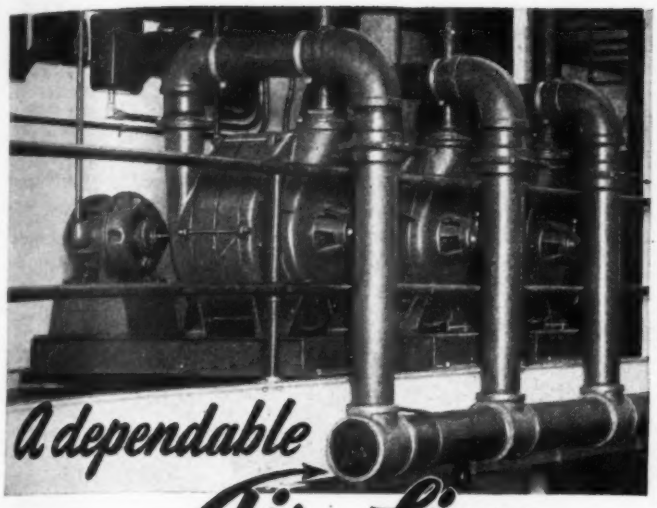
Perhaps the question would not be so ridiculous if asked by a layman, but the letter goes on to say, "I am a student of chemistry and am trying to get all the information on this subject I can. If you have any information on this subject or any pictures I would be glad to receive it, but if you don't have any information please tell me where I can get it."—Letters like that are only one reason why editors go nuts.

* * * *

When I lived in Buffalo, one of the headaches we had in reference to industrial wastes was that from a meat packing plant which boiled hams. The sewer outside the plant required frequent cleaning to remove the flow stopping accumulation of grease (in spite of grease traps). This particular waste could not be brought into any formula for sewer service charges based on waste concentration. Last time I heard, the industry was being charged for the expense of cleaning the sewer, and probably not liking it. Knowing about this, it was therefore a pleasure for me to read a newspaper report from Chicago telling of the assessment of charges of $173.56 against a firm whose oily discharges caused stoppages in the main sewers. The assessment was for cleaning the sewer. The Buffalo concern can move over; they have company now.

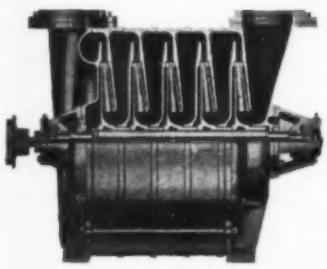
* * * *

In an issue of the Worthington News, Gano Dunn, Pres. of J. G. White Engr. Co., tells of overhearing some Englishmen criticizing American pumps because they would not deliver the rated capacity. The Britishers had forgotten that the American gallon by which the pumps were rated weighs but 8.34 lb. whereas the British Imperial gal-



A dependable Air Line

3 Dependable Blowers With Only 3 Moving Parts (Total Capacity 9,000 cfm at 7 psi)



This powerful battery of 3 Allen Billmyre centrifugal type Turbo Blowers has only 3 moving parts — only one moving rotor unit in each blower. Precision machined throughout for close but ample clearances between impellers and the interior air-seals of housing walls — for highest power-efficiency There's no wear here because the impellers do not touch the housing walls. The only parts in actual contact in *this* blower are the shaft and its bearings—for *lifetime efficiency!*

With friction thus eliminated, no internal lubrication is necessary. Only clean air — uncontaminated by lubrication — is delivered to the diffusers in your sludge aeration tanks. These Turbo Blowers hold constant pressure without any adjustments — regardless of your volume requirements.

And power input is almost directly proportional to volume of air handled — you have self-governing economical operation. Complete static and dynamic balance of the rotors eliminates vibration — they're *"whisper quiet"* at 3500 rpm after years of service!

Specify Allen Billmyre Turbo Blowers and you'll also get the advantages of rugged construction . . . outboard self-cooled bearings . . . maintenance-free operation . . . and above all — A DEPENDABLE AIR LINE good for daily 24-hour service, year in and year out.

Write today for Bulletin — 500 Sizes with volumes from 25 to 25,000 cfm and pressures from ½ to 7 psi.

ALLEN BILLMYRE COMPANY, 449 Fayette Avenue, Mamaroneck, N. Y.

ALLEN BILLMYRE
CENTRIFUGAL TYPE
TURBO BLOWERS

More Service... Less Upkeep

UNCONDITIONAL GUARANTEE
If this Housing ever Breaks or Distorts we will replace it Free
COPR 1937
THE RIDGE TOOL CO.
ELYRIA, O.

when you use the Guaranteed RIGID Heavy-Duty Pipe Wrench

● It looks different—but the real difference is in its performance. The housing simply won't break or warp—no bother or expense of repairs. Full-floating hookjaw (with handy pipe scale) and replaceable heeljaw take hold instantly, won't lock on pipe. Adjusting nut in open housing spins to pipe size. Powerful comfort-grip I-beam handle eases hard pulls. Ask your Supply House for the rugged work-saver RIGID. We're manufacturing more of them than ever, but it's not enough—please be patient.

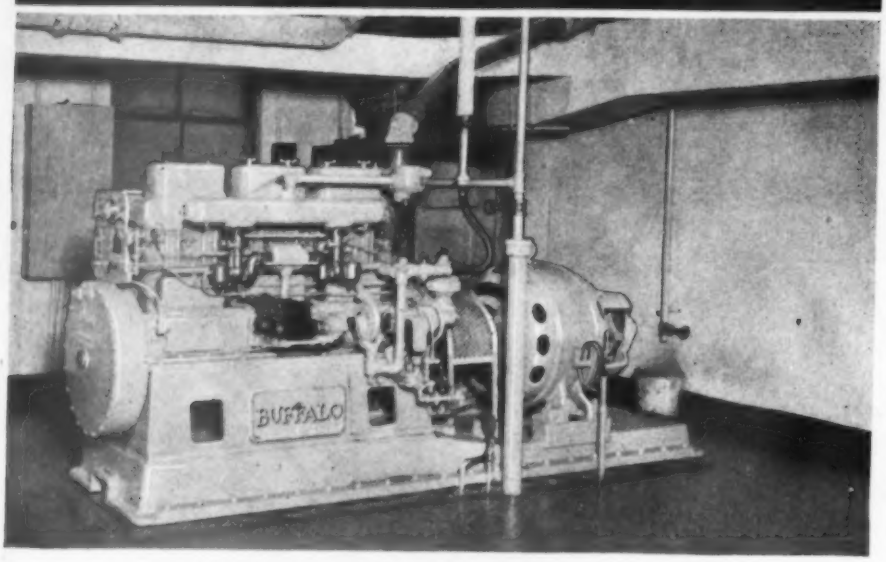
Strap Wrench, pipe to 5".

RIGID
WORK-SAVER PIPE TOOLS
THE RIDGE TOOL COMPANY · ELYRIA, OHIO, U. S. A.

BUFFALO ENGINES

ASSURANCE of PROTECTION

"Enough and on Time"



BUFFALO Type 6RA Electric Generator Unit at Western Union & Telegraph Co., Buffalo, N. Y. Instantaneous stand-by service — an essential in "communications".

WHEN a real emergency calls for power from your stand-by source, you can't wait—you want it instantly—even though you may never have called on it before.

That's when BUFFALO ENGINES deliver "enough and on time"; for example, in radio, where every second of time is sold to a critical buyer, and in telephone and telegraph communication systems, where a break of thirty seconds cannot be tolerated, BUFFALO ENGINES are preferred as stand-by equipment.

In fire, water works and flood control the same reliability stands at the service of the community that is protected by BUFFALO ENGINES.

Write for the specification sheets of BUFFALO ENGINES for your file or information on any type of application that interests you.

BUFFALO GASOLENE MOTOR COMPANY

DEPT. WW-75 BUFFALO 13, N. Y., U. S. A.

BUFFALO ENGINES — 100 H. P. THROUGH 750 H. P.— IN GENERATOR AND PUMPING SETS FOR WATER WORKS — AIRPORTS — COMMUNICATIONS — FLOOD CONTROL — HOSPITALS — INSTITUTIONS — MINES — MOVABLE BRIDGES — THEATRES — SEWAGE PLANTS.

BUFFALO ENGINES ASSURANCE of PROTECTION

lon instituted in 1834 weighs 10 lb. Mr. Dunn's explanation of the difference restored congenial "International Relations."

[And this brings to mind the chap who, in Canada from the States, instructed the filling station attendant to put in 10 gallons. When the tank overflowed before the pump meter registered 9 gal., he was ready to blame his tank gauge or the heat, until reminded that those gallons put in were "Imps" and not the 4 quart variety back in the States.—L. H. E.]

* * * *

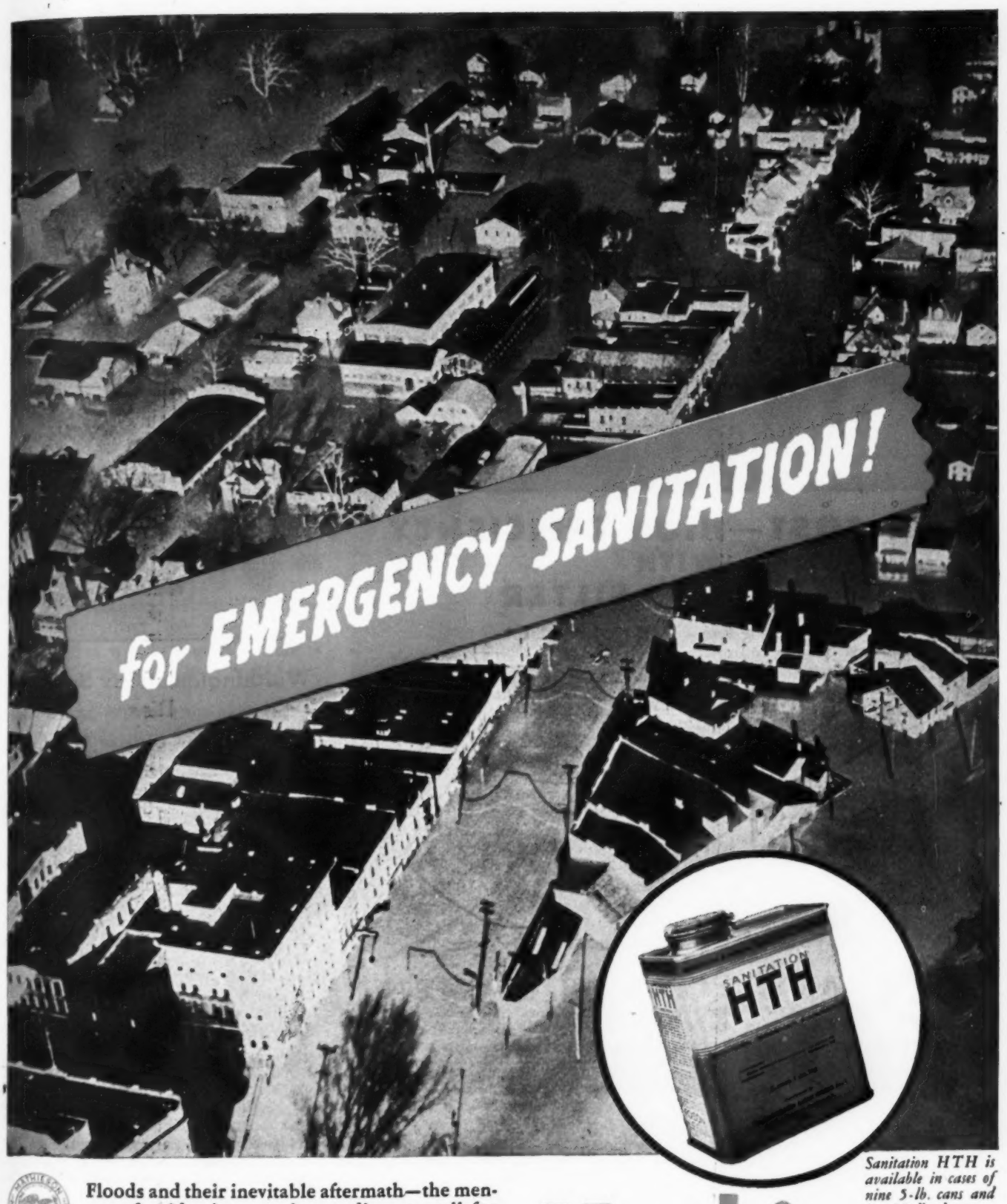
There is no denying that advertising is the life blood of a magazine, even ours; but sometimes the type of advertising offered just doesn't seem to belong to our pages. Unless we receive requests to the contrary, we shall continue to refuse to accept advertising from Human Relations Analysts and Counsellors, Mediums, Readers, and Divine Healers, recently offered us through an agency. Or could you use a good medium to locate that industrial waste that has been bothering your sewage plant, or tell you where all of your unaccounted for water is going?

* * * *

In a recent issue of *The Flow Line*, published by PEMCO, and edited by one Rod S. Reed, Jr., appeared a paragraph titled, "Who Said Pipe Dreams." Said paragraph reads as follows, "If you have any idle time on your hands, take up pipe smoking and you'll never have another idle moment, what with cleaning, filling, lighting, packing, loosening, relighting, tamping, puffing, cleaning, filling, lighting, etc."

It is quite evident that Mr. Reed is not acquainted with Linn Enslow's pipe papers, which he (L.H.E.) guarantees saves tobacco, matches, fuss, muss, dirt, and patience. One match, two at the most, required for each filling. You can lay your pipe down and it won't go out, the pipe draws easier, stays cleaner, smells sweeter. You can smoke an entire loading for there is no loss. They, the pipe papers, are excellent for cleaning dirty eyeglasses—and Harry Krum, the Water Fixer of Allentown, Pa. says they're great for cleaning microscope slides. Good for blotting lipstick too, girls.

Watch for the man with the pipe squares and try one yourself. You, too, may find in them the solution to some vexing problem.



Sanitation HTH is available in cases of nine 5-lb. cans and in 100-lb. drums.

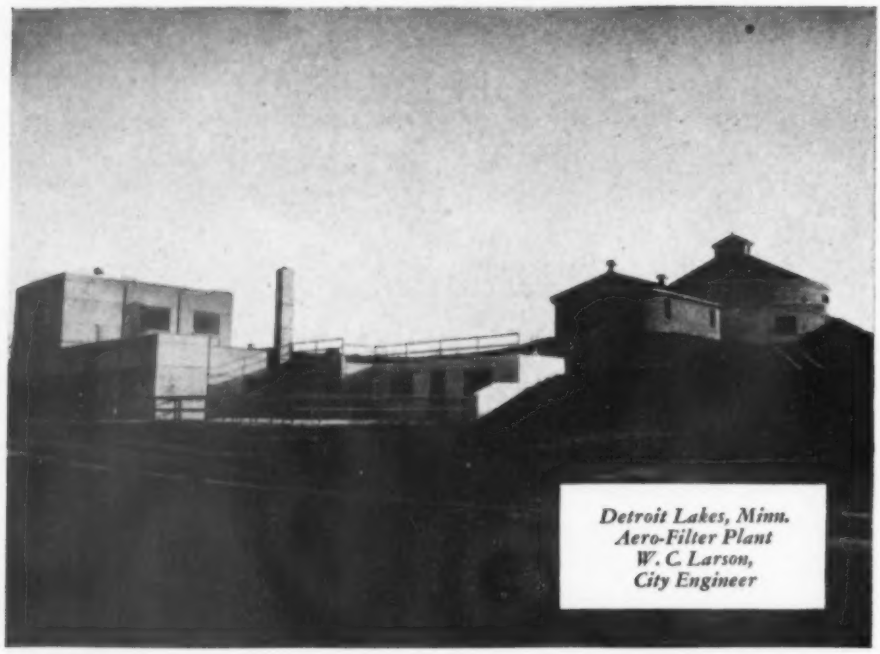
Floods and their inevitable aftermath—the menace of epidemic water-borne disease—call for quick and effective action. Countless communities stricken by flood waters know how Mathieson's Sanitation HTH affords prompt chlorination of polluted water supplies—prevents the scourge of disease and makes possible early resumption of safe water service.

Flood threatened communities should maintain adequate stocks of Sanitation HTH to secure the protection its 70% available chlorine provides in meeting flood and other emergency conditions. Check your stock now—and write or wire for an additional supply of Sanitation HTH if required.

Mathieson
CHEMICALS

THE MATHIESON ALKALI WORKS (INC.)
60 East 42nd Street, New York 17, N. Y.

SANITATION HTH . . . LIQUID CHLORINE . . . PH-PLUS . . . FUSED ALKALI . . . CAUSTIC SODA . . . SODA ASH . . . BICARBONATE OF SODA . . . CHLORINE DIOXIDE AMMONIA, ANHYDROUS & AQUA . . . DRY ICE . . . CARBONIC GAS . . . SYNTHETIC SALT CAKE . . . SODIUM CHLORITE PRODUCTS . . . SODIUM METHYLATE



Detroit Lakes, Minn.
Aero-Filter Plant
W. C. Larson,
City Engineer

LOW COST—HIGH EFFICIENCY WITH REX AERO-FILTER

The high efficiency of the REX Aero-Filter is proved again by operating data obtained from the Detroit Lakes, Minnesota, Sewage Treatment Plant. Plant units are: REX Bar Screen and Triturator, Fine Screen, REX Aero-Filter, Imhoff Intermediate Tank, Low capacity secondary Filter and REX Conveyor-Type Final Settling Tanks.

With BOD loadings in excess of 4000 lb. per acre ft. of media, 87% removal through Aero-Filter and intermediate clarifier is obtained. Overall plant efficiency is better than 95% with an average effluent of 12 p.p.m. BOD.

The combination of Aero-Block media and the REX Aero-Filter distributor allows high BOD loadings without loss of efficiency.

Rex maintains a staff of experienced sanitation engineers to help you with your waste treatment problems. Write for complete information on REX Aero-Filters and the other types of efficient Rex Sanitation Equipment. Address Chain Belt Company, 1610 West Bruce Street, Milwaukee 4, Wisconsin.

REX **SANITATION EQUIPMENT**

Bar Screens • Triturators • Conveyor and Tow-Bro Sludge Removers • Rapid and Slo-Mixers • Aero-Filter Distributors • Grit Collectors and Washers

CHAIN BELT COMPANY *OF MILWAUKEE*

Member of the Water and Sewage Works Manufacturers Association, Inc.

Major Andy Fuller, back from the C-B-I theater, after a tour in Africa, had this to say: "Contrary to expectation the African desert is not a perfect percolation bed and there is a great lack of sewage treatment in Africa. One enterprising Arab contracted to dispose of the waste liquid from an army hospital and simply piped the stuff to a patch of desert, got himself some seeds, and then sat down and let nature do the rest. All the desert needs is a little water and the vegetables really grow."

Andy also heard about "the septic tank" which produces a liquid safe for drinking—enterprising salesmen, these septic tank peddlers. In India, the sewage disposal conditions are really deplorable.—Streams are really open sewers, but are used for everything, washing, drinking and waste disposal.

"China still has its famous 'honey wagons,' and a fellow didn't dare to drive through the streets of a Chinese town in the early hours of the day until after these wagons had made their collection. If you hit one with a jeep, you got one bath and needed another one. Water in China is not to be trusted, so one followed the Chinese custom and drank tea. Attempts to get the Chinese boy to boil and cool the water were generally unsuccessful so —one drank tea."

* * * *

Answers to 20-sec. quiz.

1—(d) 1700 fold.

2—Water containing a wetting agent will wet a duck's back.

3—Heavy water (D_2O) has a molecular weight of 20 and is therefore one-ninth heavier than drinking H_2O.

"Of course, you scored 100."

MANUFACTURERS' and EQUIPMENT News

Worthington's Max Spillman Dies

Expert Pump Designer Was 64.

Max Spillman, sixty-four, engineer and expert designer of centrifugal pumps, died in his Clifton, N. J., home on June 23.

For his outstanding work in pump engineering and design of pumps, the National Association of Manufacturers awarded to Mr. Spillman its Pioneer Medal in 1940. Only recently had 200 Giant Worthington Centrifugal Pumps designed by him been shipped to Holland to dewater the areas flooded by the retreating German army. Each pump had a capacity of better than 3,000,000 gals. per minute.

Max Spillman, a native of Wohlen, Switzerland, and graduate of the University of Zurich, came to this country in 1903 and joined the Worthington Pump Co., and died in the service of this company. He made pump design history in the Worthington pumps supplied the U. S. Navy for its Panama Canal Dry Docks. Later he made further design history in the giant high lift single stage pumps which Worthington supplied for the Los Angeles and Southern California Metropolitan Aqueduct from the Colorado river.

Mr. Spillman was a member of the Am. Soc. of Mechanical Engrs. and at one time was chairman of the Hydraulic Institute's Committee on Standardization of Pumping Practices. He is survived by his widow, one son, and a grandchild.

Ethel Klingman Made Adv. Mgr. Penn Salt

Ethel Serfas Klingman, who but a few months ago was made Assistant Manager of Advertising, has now been promoted to Manager of Advertising for the Pennsylvania Salt Manufacturing Co., effective June 1, succeeding H. M. Ellsworth, who resigned on May 1.

As far as we can remember this is the first time that *Water Works and Sewerage* has been privileged to announce the appointment of a woman to the top position in the advertising department of any company. Our congratulations, Miss Klingman.

Chain Belt's Pageant of War Production

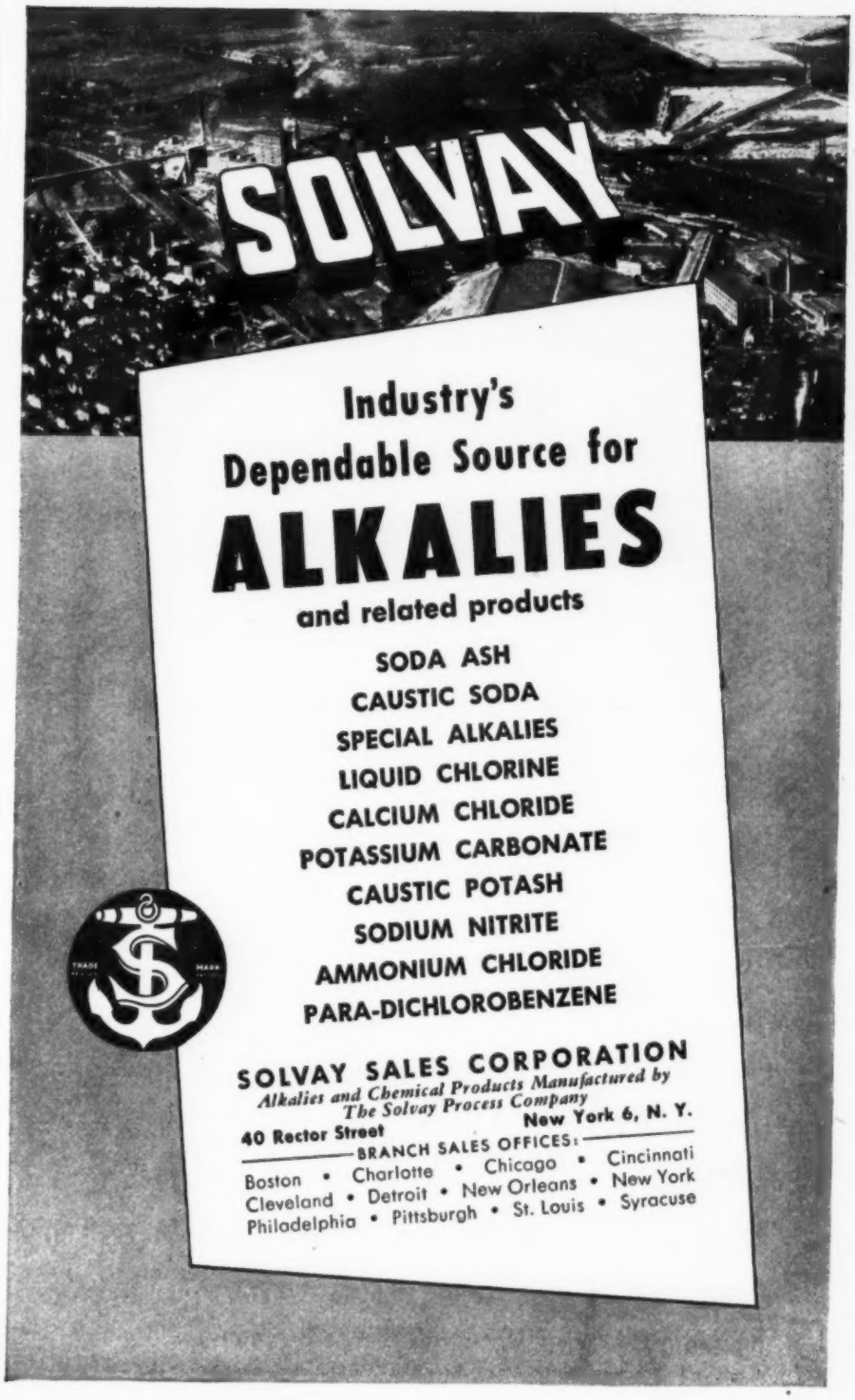
Like many another industrial plant whose equipment is familiar to the water and sewage works man, Chain Belt Co. of Milwaukee, Wis., has been actively engaged in the manufacture of war goods.

In order to let its own workers know to what extent the company had been doing its share, Chain Belt staged a "Pageant of War Production" at Milwaukee in early June. More than 6,000 employees and their families viewed the booths demonstrating the various pieces of war equipment and their application.

In addition each person received a booklet showing both by text and by official army pictures the many locations and fields in which Chain Belt's Rex equipment is being used to help fight the war. These categories, running from the making of Anti-Aircraft guns to Beating U-Boats, include sixteen different industries or war operations in which Rex equipment is used. Not the least of these is the water and sewage industry, which has contributed so greatly to war production and the health of the soldiers in camps.

Not content with helping make the tools of war, for which the compan has received four Army-Navy "E" Awards, the employees have been generous in blood donations and in bond buying. Also, 1,026 men and women of the company have joined the services. Of these, twenty-four have given their lives for their country.

According to "Bart" Marshall, now Vice Pres. of Chain Belt, the display and pageant, staged on a Sunday so



A BARREL OF SAVINGS

Here is a hydrant that can be replaced by two men in 15 minutes. No digging under the hot sun. No hammering away at frost-hardened ground. The barrel, containing all working-parts, simply unscrews at the elbow and is withdrawn through the protection case. A spare takes its place and the original goes back to the shop where repairs can be conveniently scheduled. You save your community money because fewer man-hours are required for maintenance work—and you provide better fire-protection because out-of-service time is kept at a minimum. For economy and efficiency, specify Mathews Modernized Hydrants.

MATHEWS HYDRANTS

Made by R. D. WOOD Company

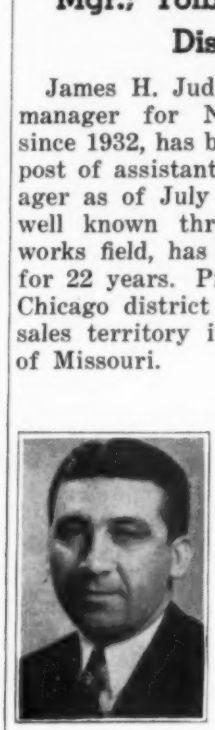
400 CHESTNUT STREET, PHILADELPHIA 5, PA.

MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

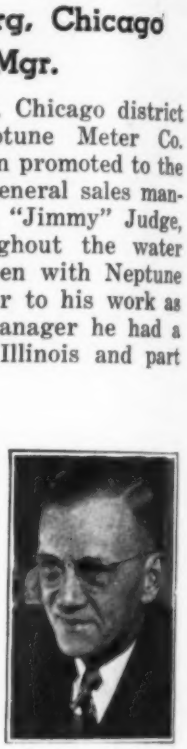
as not to interfere with war production, proved well worth the time and effort.

Neptune Meter Announces Judge as Asst. Gen. Sales Mgr.; Tolburg, Chicago Dis. Mgr.

James H. Judge, Chicago district manager for Neptune Meter Co. since 1932, has been promoted to the post of assistant general sales manager as of July 1. "Jimmy" Judge, well known throughout the water works field, has been with Neptune for 22 years. Prior to his work as Chicago district manager he had a sales territory in Illinois and part of Missouri.



James H. Judge



H. A. Tolburg

To fill the vacancy in the Chicago district office left by the promotion of Mr. Judge, Neptune announces the promotion of H. A. Tolburg of Springfield, Ill., who has been covering the state of Illinois since 1936 for the company. Previous to joining Neptune, Tolburg had 16 years' experience in the operation of municipal water works and is well known throughout the middle west.

TAPAX

The ORIGINAL and FINEST....

Manhole Cushion U. S. Pat. No. 2,050,050 offers you the simplest solution for noisy, rattling covers. Easy to install. Lasting — Economical.

Write for story of Tapax and Trial Offer.

TAPAX MFG. CO., INC.
MAMARONECK NEW YORK

..for ACCURACY and TROUBLE-FREE OPERATION

INSIST ON THE WILSON HYPO-CHLORINATOR

Engineered and Manufactured by

WILSON

CHEMICAL FEEDERS, INC.

203 CLINTON STREET BUFFALO 4, N. Y.

Northrop & Co. to Handle Clayton Valves

The Clayton Manufacturing Co. of Alhambra, Calif., has announced the appointment of Northrop & Co., Inc., 50 Church Street, New York, N. Y., as eastern distributors for the Clayton line of control valves, including Float Valves, Altitude Valves, No-Slam Check Valves, Relief Valves, Pressure Reducing Regulators, Backflow Protection Units and Vacuum Relief Valves.

Most of these units are available from stocks in Chicago at the present time.

P.C.A. Announces Reassignment of District Managers for New York, Washington, Richmond

New assignments of Portland Cement Association staff personnel have been announced by Wm. M. Kinney, General Manager of the Association, as effective from June 15.

M. J. McMillan, Manager of the Washington Office since 1936, goes to New York as Regional Manager of the Eastern Offices, 347 Madison Ave., New York 17.

James E. Dunn, District Engineer of the Richmond, Va., Office since 1938, becomes Manager of the Washington Office, 837 National Press Building, Washington 4, D. C.

Gordon S. Maynard, Field Engineer in North Carolina and Virginia for the Association since 1937, becomes District Engineer with headquarters at 1210 State Planters Bank Building, Richmond 19, Va.

Food Machinery Appointments

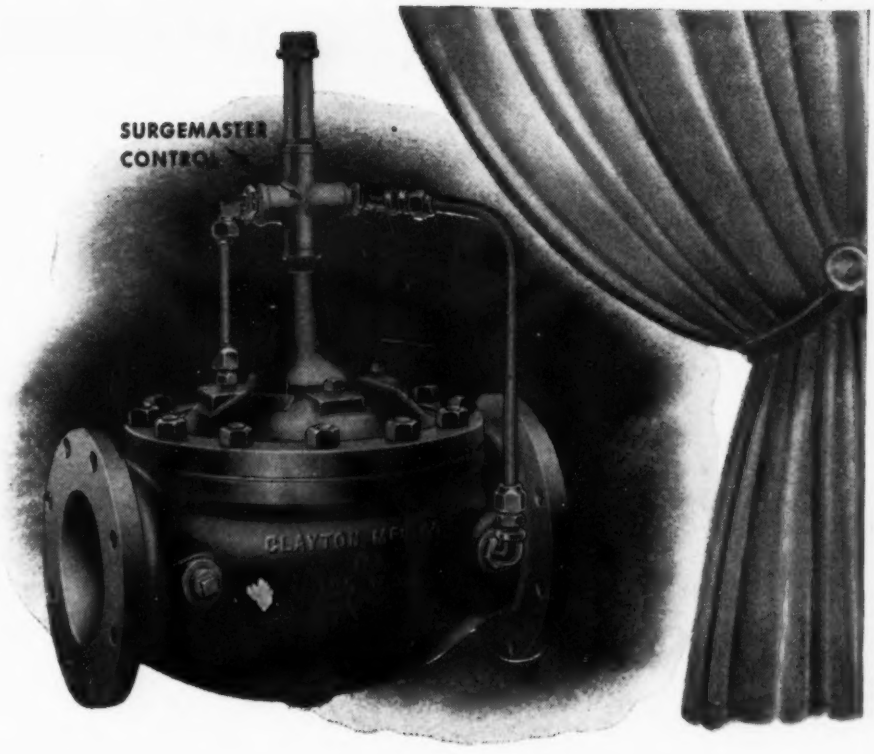
Fairman, Gen'l Mgr. of Peerless Pump Div.; McGraw, Director of Sales of Parent Company

Francis E. Fairman

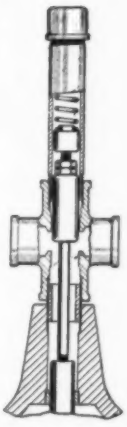
Food Machinery Corp. of San Jose, Cal., and parent company of the Peerless Pump Co., which recently purchased the Dayton-Dowd Pump Co. of Quincy, Ill., has announced two appointments.

Francis E. Fairman, Jr., a U. S. Naval Academy graduate and former General Electric executive, was named manager of the Peerless Pump Division and elected vice president of Food Machinery Corp.

A. F. McGraw, until recently general sales manager of Allis-Chalmers Tractor Division, Milwaukee, has been named Director of Sales of Food Machinery Corp. Mr. McGraw will have his headquarters in San Jose.



This new CLAYTON *Check Valve positively prevents* SURGE!



SURGEMASTER provides no-surge, no-slam control.

At last . . . the Check Valve that provides *controlled* surge protection. The Clayton HYDROMATIC Check Valve is entirely hydraulic in operation. It cannot slam. It positively prevents surge.

The HYDROMATIC Check Valve operates like a hydraulic door closer. In closing, the final action is throttled, thus effectively preventing surge. The opening operation is similarly controlled. Action in either direction starts by equalizing pressures gradually, without shock or water hammer.

Pressure to open and close the valve is directed through the SURGEMASTER Control which is adjustable to permit changing the speed of opening and closing to meet all conditions.

Write for Descriptive Bulletin • Representatives in Principal Cities

VALVE DIVISION
CLAYTON
"Feather Touch" CONTROL

CLAYTON MANUFACTURING COMPANY, ALAMEDA, CALIFORNIA

For trouble-free, low cost measurement of—

SEWAGE
INDUSTRIAL WASTES
SLUDGE
IRRIGATION WATER

BAILEY

OPEN CHANNEL METERS

Offer These Advantages:

1. Easy to Install
2. Retain Accuracy
3. Self-Cleaning
4. Adjustable Capacities
5. Totalize Multiple Flows
6. Chemical Feed Control
7. Flow and Ratio Controls

Ask for Bulletin 62

MU22

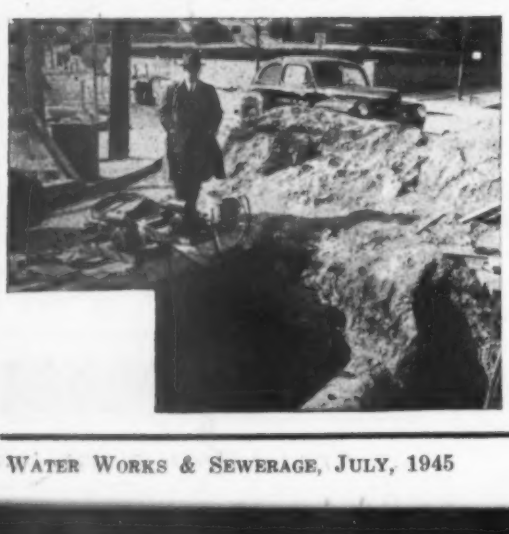
BAILEY METER COMPANY

1072 IVANHOE ROAD • CLEVELAND 10, OHIO

METERS and CONTROLS for SEWAGE and WATER

VENTURI TUBES, FLUMES, WEIRS, NOZZLES, ORIFICES • DIRECT MECHANICAL AND REMOTELY LOCATED REGISTERS • AIR-OPERATED, ELECTRONIC AND ELECTRIC CONTROLS.

WATER MAINS DISINFECTION:



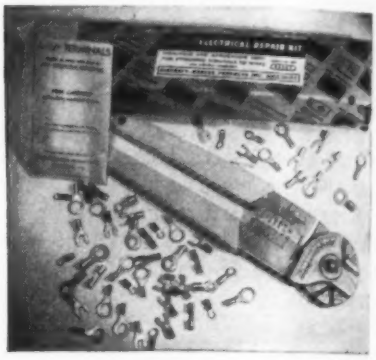
We provide chemicals, equipment, and experienced operator ready to serve you within 200 miles of Washington, D. C. Write or telephone us for information.

LUTHER and WOOD

310 Chandler Building
Washington 5, D. C.
Telephone National 2123

Kit for Solderless Electrical Wiring

Now available to industry for general solderless wiring is a new complete electrical wiring kit manufactured by Aircraft-Marine Products, Inc.



The kit comprises a precision 6-purpose installation tool. Also included in the kit is an assortment of 100 amp. solderless terminals of the most commonly used types. No soldering is required to make trouble-free electrical connections. Merely insert wire in terminal barrel and crimp with tool. The tool is also used for other operations in electric wiring, including cutting and stripping the wire.

For descriptive folder and prices on single kits or quantities write Aircraft-Marine Products, Inc., 1597-A North 4th St., Harrisburg, Penna.

Morganite Self-Lubricating Bearings

Molded with tolerances to one thousandth of an inch, yet machineable, Morganite Bearings of carbon or graphite composition are self-lubricating and offer immunity to

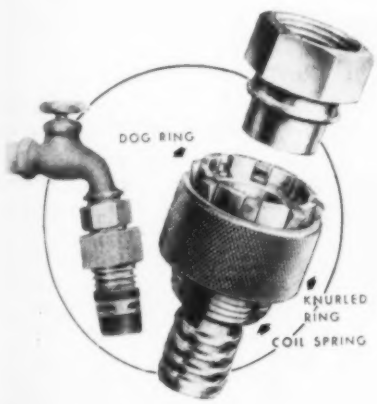
acids, alkalies, and most solvents. These bearings may also be supplied with various metallic contents for special applications. Outside diameters from ⅛ to 15 in. are possible, and the bearings may be supplied in any shape; they may be plated, shrunk, press fitted, or vulcanized to

rubber. These bearings will withstand speeds up to 50,000 rpm. and thrust loads up to 30 psi. at such speeds, or loads to 2,000 psi. at slower speeds.

A comprehensive folder on the Morganite Bearings which have application in inaccessible places and in turbines, dryers, fans, etc., may be obtained from the Morganite Brush Co., Inc., Long Island City 1, N. Y.

New Jiffy Hose Coupling

These water and sewage plants throughout the country that boast of their beautiful lawns but "beef" about the trouble they have with garden hose couplings, will be glad to learn of a new one. With only two moving parts, capable of being connected or disconnected in a matter of seconds, this new bib and



hose coupling should find use on hoses for both inside and outside use at water and sewage plants. And, we might add, also for home use.

Made of durable lightweight aluminum in ⅝, ¾ and 1-in. sizes, these couplings, which are as advantageous for connecting hose lengths together as for jiffy connections to faucets, may be obtained from the E. B. Wiggins Oil Tool Co., Inc., 3424 West Olympic Blvd., Los Angeles 23, Cal.

Tufcrete Resurfacer

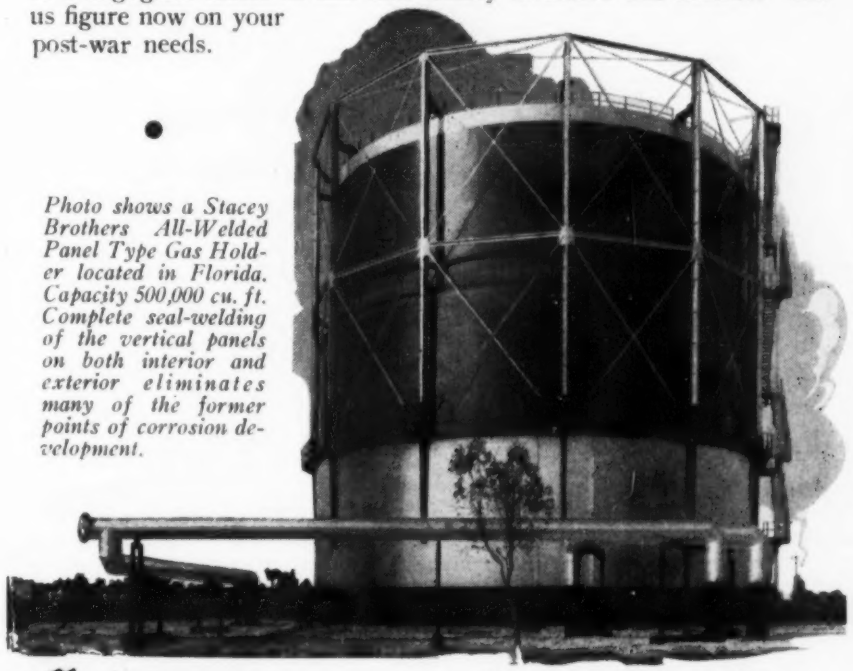
Tufcrete Resurfacer and its companion products of the Tufcrete Co. would seem to be the answer to all of your problems of floor surfacing—or resurfacing. Intended for floors that are worn—wood, concrete, brick, etc.

LEADERSHIP—

that saves you money

It has always been the policy of Stacey Brothers to improve gas holders. It is natural, therefore, that our holders have won recognition as being unequalled for design, efficiency, and quality of workmanship. Our latest development is the All-Welded Panel Type Wet Seal Holder. This modern holder offers you the triple benefits of REDUCED MAINTENANCE COSTS . . . GREATER STRENGTH . . . LONGER LIFE. The costly and troublesome interior corrosion problems usually associated with wet seal holders have been reduced to a negligible factor in this new Stacey Brothers Gas Holder. Let us figure now on your post-war needs.

Photo shows a Stacey Brothers All-Welded Panel Type Gas Holder located in Florida. Capacity 500,000 cu. ft. Complete seal-welding of the vertical panels on both interior and exterior eliminates many of the former points of corrosion development.



The STACEY BROS. GAS CONSTRUCTION CO.

One of the Dresser Industries
5535 Vine St., Cincinnati 16, Ohio

ALL-WELDED PANEL TYPE
GAS HOLDERS

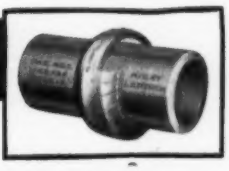
Stacey Brothers
ENGINEERS • FABRICATORS
ERECTORS • RECOGNIZED
EXPERIENCE & FACILITIES

EDSON
DIAPHRAGM PUMPS

Hand Sizes 2", 2½", 3", 4"
Power Sizes 3" and 4"
Open Discharge or Force Pump
Edson Special Suction Hose
Red Seal Diaphragms
Strainers and Foot Valves
Hose Spanners—Adapters

THE EDSON CORPORATION
Main Office and Works: 49 D St.
South Boston, Mass.
New York: 142 Ashland Pl., Brooklyn

WESTON



GASKET AND FORM
The Perfected Method for Making Sewer Pipe Joints of Cement

- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON **Adams, Mass.**

DOW

FERRIC CHLORIDE

35-47% SOLUTION
Shipped in Tank Cars

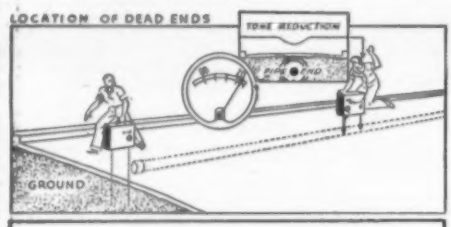
60% CRYSTALS
Packed in 300 or 500 lb. Barrels

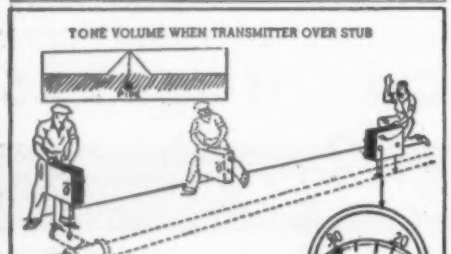
★ SLUDGE CONDITIONING

★ SEWAGE COAGULATION

★ WATER PURIFICATION

THE DOW CHEMICAL COMPANY
MIDLAND MICHIGAN





M-SCOPE
Buried Pipe Finder and Leak Detector

FREE 16 PAGE BOOKLET UPON REQUEST

The M-SCOPE consists of a specially designed radio Transmitter and Receiver, with conductive wire. In operation, the Transmitter sends out a continuous signal, and when there is no metal between Transmitter and Receiver, a definite volume of sound is heard in the Receiver earphones and the meter (mounted on Receiver) gives a definite reading. If a metal object lies between the two units, sound in earphones is louder and meter reading higher—and the pipe or other metal object is located.

The M-SCOPE is solving — successfully — the varied problems involved in the development, operation and maintenance of buried pipe and cable systems and is in daily use by representative organizations in such important groups as:

- Government Projects
- Municipalities
- Sewerage and Water Plants
- Consulting Engineers
- Airports
- Public Utilities
- Industrial Plants
- Oil and Pipeline Companies

Write for further particulars and booklet:

FISHER RESEARCH LABORATORY
Direct Teletype PALO ALTO, CALIFORNIA

etc., this material will bond to concrete, composition, or any other of these surfaces.

It is unnecessary to chip out holes, and the material may be feather-edged. Simple of application, requiring only that the surface be cleaned and primed, the Resurfacer mixed with cement, sand and water when applied will cure in 36 hours.

For floors subject to excess grease, oils, or dragging of materials, Tufcrete Tufdense is recommended. Another product is Tuftop; used on ordinary concrete floors to prevent ruts and holes, it makes concrete dustproof and gives a hard surface as it penetrates about 1/16-in. Tuftite is for the stoppage of water seepage in basement walls, even against hydrostatic pressure. These products or further information about them are available from the Tufcrete Co., 625 S.W. Ninth St., Des Moines 9, Iowa.

Farris Diaphragm Relief Valve

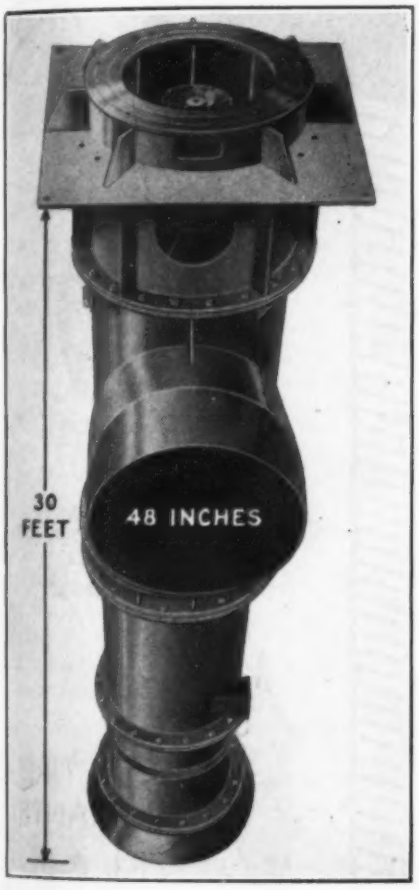
The Farris Relief Valve, Type 1000, originally designed for use aboard Naval and Merchant Marine Vessels, is finding use in chemical and industrial installations. Of unique construction, the diaphragm acts in several capacities, sealing the valve from leakage around the stem, making it acceptable where there is fluid constantly on the downstream side.

The valve will open to full relieving capacity at only 20 per cent overpressure. The valve opens as a result of pressure on the diaphragm and since its area is much greater than the valve disc, the force is multiplied many times. This type valve will close at the set pressure and does not require a pressure drop below the set pressure to actuate closing. There is no loss of pressure or weeping. This Farris valve is being ex-

panded to all sizes and types of connections to meet increased demand, and a bulletin on the valve may be obtained from Farris Engineering Co., 345 Commercial Ave., Palisades Park, N. J.

Morris Straightflo Pumps

The accompanying photograph shows one of a new series of Morris straightflo pumps. Driven by a 350 hp. motor and weighing 15 tons, these pumps will deliver 72 mgd.



The first two of these pumps were built in the record time of three months at the Morris Machine Works, Baldwinville, N. Y., and are being installed in a butadiene plant at Port Neches, Texas, to supply river water used in the synthetic rubber process.

Cooper Bessemer Gas-Diesel Engine

Predicts Possible Savings at Cleveland Plant

Based on a study of the annual report of G. E. Flowers, Supt. of the Cleveland Southerly Sewage Treatment plant, Cooper-Bessemer Corp. of Mt. Vernon, Ohio, has predicted

CEMENT GUN COMPANY
"GUNITE" CONTRACTORS
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.

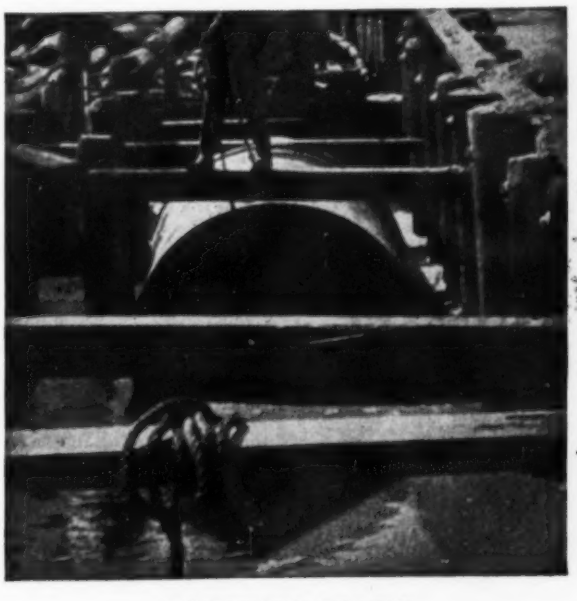
REHABILITATED WITH "GUNITE"

Above is shown Lower Doughty Pond Dam of the Atlantic City, N. J., Water Department, a concrete structure with fresh water up-stream, and tide-water down-stream. Progressive disintegration and erosion became so pronounced by 1941 that immediate repairs were required. We were called in and the repair work was done by us that year.

The left hand photo shows the condition of the concrete before repairs; the center photo shows the "GUNITE" work in progress, and the right hand photo shows the completed work. "GUNITE" on the up-stream and down-stream faces was placed to a minimum of six inches with double mesh reinforcing. The wing walls were likewise repaired with a minimum of two inch "GUNITE" and single reinforcement.

Our Bulletin C 2300 describes this and many other similar jobs.
Write for your copy.

MANUFACTURERS OF THE "CEMENT GUN"



84" pipe—Spring Lake, N. J.

FLANGED PIPE
FLEXIBLE JOINT PIPE
BELL & SPIGOT PIPE
SPECIAL CASTINGS
SHORT BODY BELL & SPIGOT SPECIALS

Large stock enables us to make prompt shipments.

CAST IRON PIPE

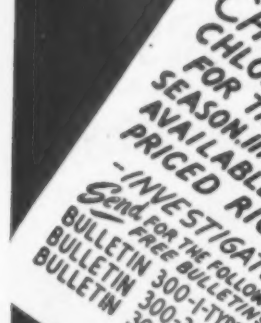
SIZES 2" TO 84"

Warren Foundry & Pipe Corp.

11 Broadway, New York

Warren Pipe Company of Mass., Inc.

ORDER NOW YOUR CHEMCO CHLORINATORS FOR THE 1945 SEASON. IMMEDIATLY AVAILABLE AND PRICED RIGHT
-INVESTIGATE-
Send FOR THE FOLLOWING FREE BULLETIN'S
BULLETIN 300-1-TYPE-M-1
BULLETIN 300-3-TYPE-M-3
BULLETIN 300-5-TYPE-M-5
R.S.T.



CHEMCO TYPE M-1

CHEMCO TYPE M-3

OTHER "CHEMCO" PRODUCTS
FILTERS
WATER SOFTENERS
HYDROGEN ION PLANTS
COMPLETE PURIFICATION SYSTEMS
FOR SWIMMING POOLS ETC.

CHEMCO TYPE M-5

CHEMICAL EQUIPMENT CO.
MAIN OFFICE - LABORATORY - FACTORY
323 CENTER ST. - LOS ANGELES 54 - CALIF.
MIDWEST FACTORY BRANCH
201 W. HACKER DR. CHICAGO, ILL.
REPRESENTATIVES IN PRINCIPAL CITIES

that the new dual fuel gas-oil Diesel engine could save at least $33,000 a year in the operation of that plant.

These new dual fuel units, which were announced in this column within the last few months, have the distinct advantage of being able to run on gas plus a small amount of oil or any combination of gas and oil, thereby making the engines fully operative throughout the year in spite of fluctuation of the gas supply.

On the basis of the study of the Cleveland plant report, Cooper-Bessemer predicts that this dual fuel engine will provide big savings in all sewage plants where gas is produced and power consumed.

YOU *vs.* Some Jap

Somewhere there's a home front Jap who is pitted personally against you in this war. And you can bet . . . that Jap is saving critical materials for all he's worth.

The Pacific war is calling for vast quantities of paper packaging to protect vital supplies against the long sea journey, heat, cold, moisture, mildew, contamination and storage hazards. So won't you do this . . . ?

—Share this magazine with others (It is not only thinner but fewer are being printed because of the paper shortage).

—Unless it is to be preserved for reference, be sure that the last reader turns it in for salvage.

—Look around in cellar, attic and store-rooms for those bundles of old magazines you don't need any more . . . and turn them in!

A little thing to do . . . but it means so much!

Wayne Schultz Returns to Hill, Hubbell

Wayne H. Schultz has returned to the staff of Hill, Hubbell & Co., Division of General Paint Corp. of Cleveland, as Field Engineer and Eastern Representative. Mr. Schultz, who has been on a leave of absence during the war emergency, is well known in the field of steel pipe protection and has had wide experience in the coating-wrapping-and-lining of steel pipe for water works and sewage purposes.

EDDY
FIRE HYDRANTS AND VALVES
WATER WORKS EQUIPMENT

EDDY VALVES
For
Water Works
and
Sewage Disposal
Plants

EDDY FIRE HYDRANTS
For Fire Protection Service

Write for Complete Catalog

Eddy
VALVE COMPANY
WATERFORD N.Y.

Alden Joins Foxboro Engineering Staff

The Foxboro Co., maker of industrial instruments for measurement and control, has announced that Clifford E. Alden has joined its staff and will make his headquarters at the home office, Foxboro, Mass. Mr. Alden has had wide experience in the field of municipal engineering and will specialize in the instrumentation of water works, sewage disposal plants, garbage incinerators and similar public works, as well as equipment and facilities of similar nature when operated as parts of industrial plants.

Mr. Alden is a graduate of Georgia School of Technology and a member of the ASME. During some twenty years of sales and engineering experience he has been associated with prominent companies supplying equipment for public works plants.

Czarniecki of Byers Dies

Myron J. Czarniecki, vice president in charge of sales for A. M. Byers Co., died suddenly on June 18 at his home near Pittsburgh. He was 53 years of age.

Mr. Czarniecki, who entered the employ of the Byers organization in 1913, became manager of the company's Chicago sales office in 1919 and advanced through several managerial positions until his election to Vice-President in Charge of Sales in 1934.

Mr. Czarniecki was a member of the American Iron & Steel Institute, American Petroleum Institute, American Water Works Association, American Gas Association, Water & Sewage Manufacturers Association, the Engineers Society of Western Pennsylvania, as well as several other technical organizations.

Corydon Corp. Succeeds Chem-Feeds Inc.

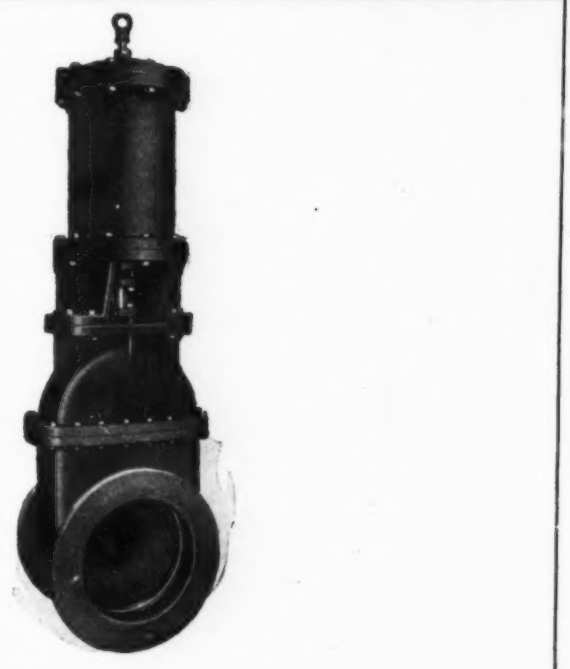
A new company, known as the Corydon Corp. has succeeded Chem-Feeds, Inc. which has been manufacturing hypochlorinators and

KNOW YOUR SEWAGE TREATMENT PLANT PERFORMANCE. USE INFILCO AUTOMATIC SAMPLERS *with refrigeration!*

Samplers may be had with manual adjustment of sampling interval or with automatic proportioner control.

Ask for Bulletin 2430

INFILCO INCORPORATED
325 W. 25TH PLACE, CHICAGO 16, ILL.

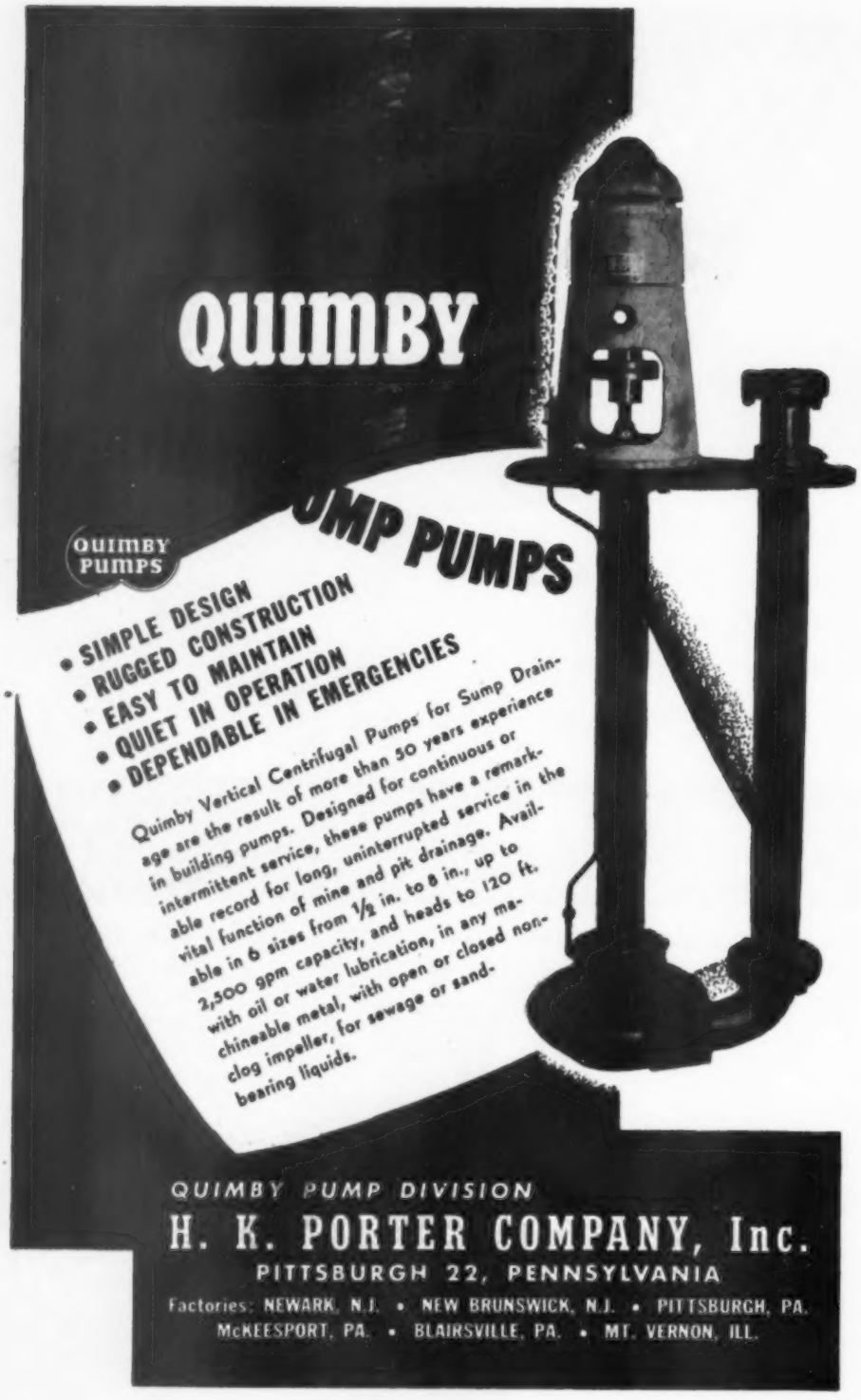


RENSSELAER

Hydraulically Operated Gate Valves

Proven by Performance

RENSSELAER VALVE CO. TROY, N. Y.


QUIMBY
QUIMBY PUMPS
• SIMPLE DESIGN
• RUGGED CONSTRUCTION
• EASY TO MAINTAIN
• QUIET IN OPERATION
• DEPENDABLE IN EMERGENCIES
Quimby Vertical Centrifugal Pumps for Sump Drainage are the result of more than 50 years experience in building pumps. Designed for continuous or intermittent service, these pumps have a remarkable record for long, uninterrupted service in the vital function of mine and pit drainage. Available in 6 sizes from ½ in. to 8 in., up to 2,500 gpm capacity, and heads to 120 ft. with oil or water lubrication, in any machineable metal, with open or closed non-clog impeller, for sewage or sand-bearing liquids.
QUIMBY PUMP DIVISION
H. K. PORTER COMPANY, Inc.
PITTSBURGH 22, PENNSYLVANIA
Factories: NEWARK, N.J. • NEW BRUNSWICK, N.J. • PITTSBURGH, PA.
McKEESPORT, PA. • BLAIRSVILLE, PA. • MT. VERNON, ILL.

chemical feeders since April 1943. Associated with Jeff Corydon in the new company is J. F. Dixon, of Toronto, who as vice president will manufacture the Corydon line of equipment in Canada. At present the company specializes in light weight portable hypochlorinators with feed control by variable speed and high stroking rates.

Jeff Corydon is well known in the water works field, having been one of the founders of Proportioneers, Inc. in 1932 and its president until he resigned in 1942 to organize Chem-Feeds, Inc. Mr. Dixon has been a manufacturer in Toronto for several years.

Hamilton Service Engineer for Quimby Pumps

H. K. Porter Company, Inc. has appointed J. C. Hamilton as Service Engineer for Quimby Pumps in Chicago and surrounding territories.

Mr. Hamilton, an Industrial Engineer, is a graduate of Carnegie Tech, and was previously with the sales department of Pittsburgh Equitable Meter Co. He will make his headquarters at 332 South Michigan Ave., Chicago.

Lyle Appointed Ludlow's Southeast Representative

Jack C. Lyle, for some years a representative and district sales manager in the southeast for supply houses and manufacturers, has joined the staff of the Ludlow Valve Mfg. Co. of Troy, N. Y.

Mr. Lyle, a graduate of the University of Tennessee, will make his headquarters in Atlanta, Ga., and will cover Alabama, Georgia, Western North Carolina, Eastern Tennessee and Florida.

LITERATURE AND CATALOGS

Overhead irrigation is used in a banana plantation in Panama, and the Halawa Water Project of Honolulu now furnishes this city with an additional 10 mgd. of water. These are two facts learned from the 2nd quarter issue of **Pipe Progress**, published by the American Cast Iron Pipe Co., Birmingham, Ala.

This Honolulu supply is obtained from an artesian source four miles from the city, but in that four miles the 42-in. pipe goes through two tunnels, one 2,500 ft. and the other 3,500 ft. long. The pump room itself is located at the bottom of a 300-ft. tunnel dug on a 30 degree angle, and the pumps take suction from 30 ft. below that level. This source will ultimately develop 20 mgd. and relieve the load on the old supply which was called on to furnish the normal demand of 68 mgd.

This issue of **Pipe Progress** also contains a story of how ACIPCO cast iron pipe is made, how the electric furnaces operate, how the test bars are poured, and other interesting phases of the operation of the sand-spun pipe foundry.

* * * * *

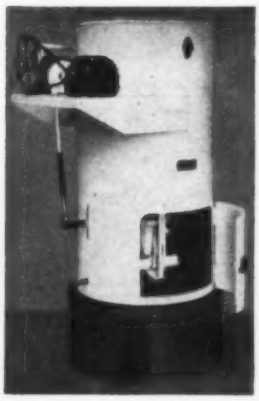
Did you ever hear a couple of words that seemed to fit together rhythmically and then have those words pound in your ear with every click of the train wheels under you? That happened to us coming back from Chicago recently when the words "Crocker-Wheeler" clicked off

do your plans call for a volumetric feeder?

SPECIFY AN

OMEGA

UNIVERSAL



These rugged, dependable volumetric feeders will feed:

Alum	Lime
Ferrisul	Soda Ash
Ferrifloc	Carbon
Ferrous Sulphate	Clay, etc.

Dissolving chambers of proper capacity are furnished for rate of feed specified.

Other OMEGA Products

Gravimetric Feeders
Solution Feeders
Lime Slaking Equipment
Mechanical Agitators
Bucket Elevators
Laboratory Stirrers

Write for descriptive bulletins

Sincerely

OMEGA MACHINE CO.
(Division of Builders Iron Foundry)
10 CODDING ST., PROVIDENCE 1, R. I.

each joint in the rails. Where we first heard the words, we can't remember, but it was a surprise to us to find on the desk when we arrived a series of **Bulletins of the Crocker-Wheeler Electric Mfg. Co.** of Ampere, N. J.

Included was Bulletin No. 252—Large Induction Motors, and leaflets on Protected Type Motors, Wound Rotor Motors (1 to 75 hp.), Fans and Blowers, Alternating Current Motors for Pump Applications, Squirrel Cage Motors (½ to 75 hp.), Direct Current Motors, etc., as well as the Resilient Flexible Couplings (Edmunds Type).

With all of the motors used in water and sewage plants for various duties, we were surprised not to see some reference (besides pumps) in the bulletins to other applications of the products. Crocker-Wheeler Electric Mfg. Co., Division of Joshua Hendy Iron Works, should have an answer for nearly any of your motor requirements or installation problems. These bulletins and further information may be obtained by writing to the Crocker-Wheeler executive office in Ampere, N. J., or to any one of a number of branch offices.

* * * *

It's a long time since January 1945, but we just ran across the **Statistical Number** of the **Journal of the Missouri Water and Sewerage Conference**, which was apparently published in January 1945. Not only does this issue contain a list of licensed water works operators but it also contains a census of public water supplies showing a population source of supply with a storage capacity, plant output, treatment, laboratory control and water storage. In addition, these supplies are classified according to source, according to treatment, and according to ownership, population and treatment.

This Statistical Number also contains a census of Missouri sewage plants, with information on the population served, treatment, design flow, drainage basin, and receiving bodies of water.

The issue also contains a list of members of the Missouri Water and Sewerage Conference as well as the list of all superintendents of both water and sewerage works in the state of Missouri.

This worthy journal is edited by Warren A. Cramer, of Jefferson City, Secretary of the Missouri Conference.

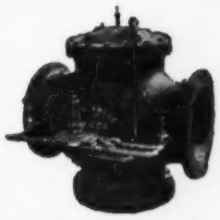
· 1879 ·

ROSS

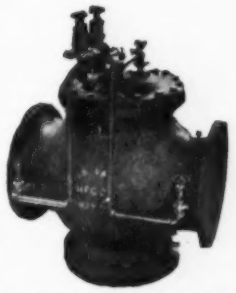
AUTOMATIC VALVES

ALTITUDE VALVES • SURGE • RELIEF • BACK PRESSURE VALVES

FLOAT VALVES • REDUCING AND REGULATING VALVES



ALTITUDE VALVES
for
Control of elevation and heads into and out of tanks, basins and reservoirs, hydraulic control.
1. Single acting.
2. Double acting.
3. Combination assembly for three or more automatic operations.
4. Can be equipped with electric and manual controls.

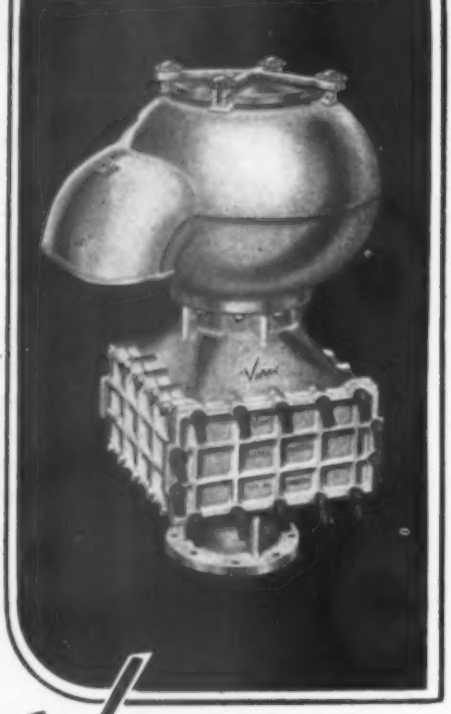


COMBINATION VALVE
This valve will permit flow in one or both directions acting as
1. Pressure Reducing and Relief Valve.
2. Pressure Reducing and Altitude Valve.
3. Relief and Altitude Valve.

REMOTE CONTROL VALVE
Electric remote control—solenoid or motor can be furnished.
Adapted for use as primary or secondary control on any of the hydraulically controlled or operated valves.

ROSS VALVE MFG. CO.
INCORPORATED
P. O. BOX 595, TROY, N. Y.

Effective IMMEDIATELY



"Varec" approved

PRESSURE AND VACUUM RELIEF VALVES WITH FLAME ARRESTERS

are again available in

ALUMINUM

"VAREC" Research protects users of "VAREC" Pressure and Vacuum Relief Valves and Flame Arresters. Adapting the application of Aluminum to this field, in 1928, "VAREC" Laboratories and Engineering skill are working ceaselessly to develop greater service potentialities from the company's products. Experience gained in unprecedented wartime obligations, added to years of pioneering, is now being reflected in the service of "VAREC" equipment.

The Pace Setter Since 1928

THE VAPOR RECOVERY SYSTEMS CO.
COMPTON, CALIFORNIA
New York City—New Orleans, La.—Houston, Texas
Tulsa, Okla.—Agencies Everywhere

It's been some time since we packed a pump with **Palmetto Packings**; in fact, it's been a long time since we packed a pump. If we had one to pack now, it's an even bet that we'd find Bulletin P-3, **Palmetto Packings**, a very useful pocket size folder. Greene, Tweed & Co., Bronx Blvd. at 238th St., New York 66, N. Y., have published this very useful hand guide to selecting the most suitable packing for specific fluids, equipment, and types of service.

The folder contains condensed descriptions of each grade of Palmetto Packing, and gives the leading features and purposes, accompanied by identifying illustrations. The center pages are arranged to combine complete application chart with marginal references to each of the packings. A tabulation of the approximate length per pound of each type of packing is also included. If you have a packing problem, this folder is worth writing for. Address your request to Greene, Tweed & Co.

* * *

We'd never have believed it if we hadn't read it in Folder No. 345 of the Wailes-Dove-Hermiston Corp. (Westfield, N. J.), but "one application of **Bitumastic No. 50** is equal to from 5 to 8 coats of ordinary paint." This Bitumastic No. 50 is a thick film coating for protecting metal and concrete surfaces against severe corrosive and deteriorating conditions. It is recommended for cast iron pipes, concrete sewer pipe and structures, sewage plant equipment, steel piling, above-ground piping, meters and curb boxes, structural steel, and many other uses. A postcard or letter to the company in Westfield, N. J., will bring the information on this product.

* * *

If you have ever viewed the majesty of the Falls of Niagara and contemplated the number of tons of water that roar over its brink each second, then you'll know that the Fairbanks-Morse Co. had a purpose in naming their **Niagara Propeller Pumps** after the great cataract. According to the bulletin, numbered Fig. 6310, these vertical propeller pumps are designed for large capacity low head pumping service. This bulletin shows a diagrammatic sketch and describes briefly each

'BESTOLIFE

LEAD SEAL
JOINT SEALING
AND ANTI-SEIZE
PIPE JOINT COMPOUNDS

'BESTOLIFE Compounds have been used successfully for years in Water Works and Sewerage plants.

They obtain their effective anti-corrosion sealing characteristics from the metallic lead base of the compounds.

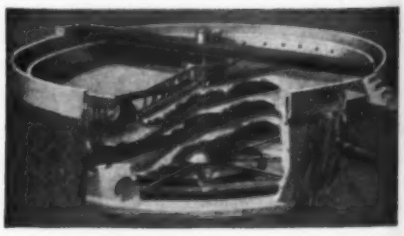
Use 'BESTOLIFE Compounds on water, oil, gas and gasoline lines; all threaded connections in valves, hydrants, pumps, engines, air compressors, etc., and on all studs and bolts. Also recommended for meter repairing.

Manufactured Exclusively By

I. H. GRANCELL

MIRAMONTE AND EAST NADEAU ST.
LOS ANGELES 1, CALIFORNIA

EXPORT: THE NATIONAL SUPPLY CORP.



P.F.T. Clarifiers for Rapid Precipitation of Sewage Solids

The P.F.T. Tray Clarifier embodies a design which affects the continuous rapid separation of the solids and liquid in sewage; and the immediate removal of the clarified effluent. A series of shallow settling areas over which the sewage is spread assures speedy precipitation. Its high rate of flow provides maximum capacity in minimum space; reducing the construction and operating costs of clarification equipment.

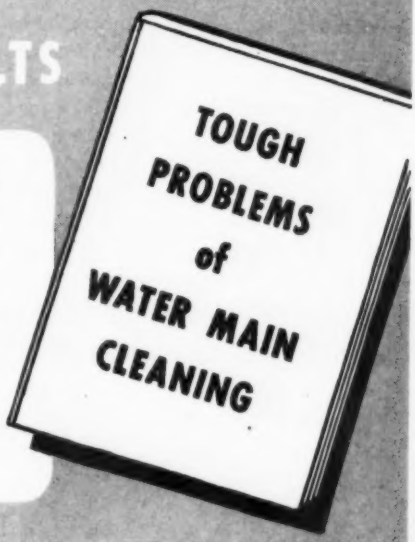
Write for Bulletin No. 210 containing complete information, including operating results.

P.F.T. Pacific Flush-Tank Company
4241 Ravenswood Ave., Chicago, Ill.
New York Charlotte, N. C.

IT'S AN OLD STORY TO US

TEST OUR PROVEN FORMULA—

EXPERIENCE + EQUIPMENT = RESULTS



NATIONAL has the Experience — Each NATIONAL Superintendent is a man of long experience and has the added benefit of the Company's knowledge gained through 38 years — 1907 to 1945.

NATIONAL has the Equipment — For 38 years NATIONAL has been perfecting equipment to meet all sorts of pipe cleaning conditions.

NATIONAL GETS RESULTS — A NATIONAL pipe cleaning job guarantees the removal of all deposits, incrustations, tubercles and growths and restores the pipe to almost 100% of its original carrying capacity. Greatly reduced operating costs save the cost of cleaning many times over.

The NATIONAL METHOD

National Water Main Cleaning Co.

30 CHURCH STREET, NEW YORK 7, N. Y.

1221 Mortgage Guarantee Bldg., Atlanta 3, Ga.
607 1st Nat'l Bank Bldg., Birmingham 3, Ala.
115 Peterboro St., Boston 15, Mass.
205 W. Wacker Drive, Chicago 6, Ill.
P. O. Box 683, Jacksonville 1, Fla.

BRANCHES

421 B M A Building, Kansas City 8, Mo.
2028 Union Ave., Montreal 2, Canada
3812 Castellar St., Omaha 5, Nebr.

210 E. Franklin St., Richmond 19, Va.
7103 Dale Ave., St. Louis 17, Mo.
501 Howard St., San Francisco, Calif.
P. O. Box 887, Waco, Texas
576 Wall St., Winnipeg, Canada

LEADITE

The Pioneer Self-Caulking Material for C.I. Pipe

the RIGHT combination

for miles of permanent jointing

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia 2, Pa.

No Caulking

CALL FOR BIDS

Filtration and Pumping Facilities, Pipe and Pipe Line Construction

Sealed bids will be received by the City Clerk of Roanoke, Virginia, in his office up to 2:00 o'clock P. M., Eastern War Time, August 20, 1945, on the following water works improvement contracts:

A—Filter Plant Structures.
B—Filter Equipment.
C—Pumpng Equipment.
D—Slow Mix Equipment.
E—Pipe and Fittings.
F—Valves.
G—Pipe Line Construction.
H—City Farm Reservoir Construction.

All such bids will immediately be presented to Council at its regular session and there opened and read in the presence of such bidders as care to be present.

The plans and specifications are on file and may be examined at the office of the Water Department of the City of Roanoke, Virginia, at 20 Salem Avenue, East, and at the office of Alvord, Burdick & Howson, Engineers, at 20 N. Wacker Drive, Chicago 6, Illinois.

Plans and specifications may be obtained by depositing $10.00 for contracts A, E and G, and $5.00 for Contracts B, C, D, F and H, with the Water Department of the City of Roanoke or Alvord, Burdick & Howson for each set so obtained. The amount of the deposit for one set will be refunded to each actual bidder who returns the plans and specifications in good condition within 10 days after the opening of bids. Additional copies of the plans and specifications may be bought for the same price, with no refund.

Each bidder shall deposit wtih his proposal a certified check in favor of the City of Roanoke, in the amount of five per cent (5%) of his bid, which shall be forfeited in case the contractor fails to enter into contract with good and sufficient bond within ten (10) days after the contract has been awarded to him.

No bid may be withdrawn, after the time for opening bids is past.

The right is reserved to reject any or all bids or waive any informality in any bid, and to accept any considered advantage to the City of Roanoke.

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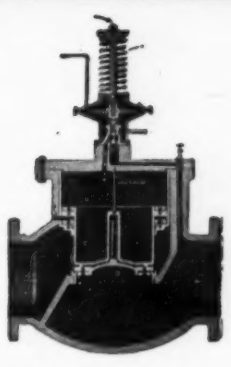

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detail of these pumps from the motor at the top to the suction strainer at the bottom.

Accompanying the folder mentioned above is another bulletin, **Oil Lubricated Turbine Pumps with Enclosed Impellers, Fig. 6920.** This bulletin, too, shows a cutaway sketch of the details of construction and in addition shows various sizes and ratings, as well as the various types of head offered with these turbine pumps. These heads include belted, geared, and combinations. Either or both of these bulletins may be obtained by writing to Fairbanks-Morse & Co., Chicago 5, Ill.

* * *

We just ran across a brochure entitled the **Professional Record of Albright and Friel, Inc.,** Consulting Engineers of Philadelphia, Pa. Of course, we know something about the principals of the firm and were not surprised at either the history of the organization or the wide variety of clients and assignments they have had. On the other hand we were particularly interested in the dignity and effectiveness of the layout and format presenting this information, as well as the fact that the brochure emphasizes the need for plans and specifications to be prepared now. From the standpoint of these engineers this brochure is certainly an adjunct to the **Blueprint Now** booklet that was issued last year. The address of Albright and Friel is 1520 Locust St., Philadelphia 2, Pa.

* * *

"The gasket that breathes" is the characterization of **Ajax Spiral-bound Gaskets,** produced by the U. S. Gasket Co. of 1738 Pierce Ave., Camden, N. J. Primarily designed for boiler handhole, manhole, tubecap and other boiler accessories, these gaskets are described in the bulletin mentioned. Perhaps some of you fellows in the steam water plants or sewage plants with steam boiler heating may be interested.

* * *

Morganite Bearings, including metallic and non-metallic content bearings, composite bearings, and machined or molded shapes of special quality, and of self lubricating materials are described in a six page folder issued by Morganite Brush Co., Inc., Long Island City 1, N. Y. These Morganite bearings, which emphasize freedom from fluid lubrication, are produced in several series, as carbon, electrographite, graphite, copper-graphite, graphite-and-other metals, etc. The bulletin is available on request to the company.

* * *

We don't think we should let another month go by without mentioning the **Bulletin of the Massachusetts Department of Public Health.** Called the **Sanitalk Number,** these issues contain abstracts of current and pertinent articles on water and sewage treatment. Such items as "Engineers and Engineering in the Massachusetts State Board of Health," an interesting historical account by Gorden M. Fair, Land Fill Disposal, Studies in Trichinosis, Wartime Shellfish Problems, Standards for Municipal Sewage Plants, Difficulties and Limitations in the Bacteriological Examination of Water (this one from **W. W. & S.**), Court Decisions on Public Health, and an Interpretation of Water Standards by J. K. Hoskins, have appeared in recent

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issues. It's a clever idea, this mimeographed 5½ by 8½ inch bulletin. We don't know whether or not it will be sent outside of Massachusetts, but you residents of Mass. should certainly be on the mailing list of the Dep't. of Public Health.

* * *

Browsing through Josam's **News Digest,** we ran across an item extracted from the *Master Plumbing and Heating Contractor,* entitled "Polio and Faulty Plumbing." Written by John K. Dorsey, it calls attention to the relation of flies to the spread of this virus from excreta. Just serves to remind us of the need for cleanliness around a sewage plant.

Other news from Josam recently announces a publication called **Grease Interception: Manual A.** Among the many features in the manual is a Handy Selection Chart for the equipment, a Master Selection Formula which simplifies the selection of the correct grease interceptor; description of three different types of Flow Controls; prints of actual installation details; and a Handy Data Sheet. In 8½x 11 in. file size, the Manual A is available on request to Josam Mfg. Co., 320 Empire Building, Cleveland, O.

* * *

We have just received a copy of a bulletin on Permutit's **Drinking Water from Sea Water.** A four page folder, it tells how this revolutionary water treatment kit functions to turn poisonous sea water into something that may not taste like the cool refreshing liquid from the Old Oaken Bucket but will serve the same purpose.

Along with this bulletin came a very useful copy of **Permutit's Data Book.** This 56-page book is filled with data on everything of interest to the water or sewage works operator, from hydraulics, hardness, and chemical conversions to solubility of oxygen, logarithms, and weights and measures. Either of these items may be obtained from the Permutit Co., 330 W. 42nd St., New York 18, N. Y.

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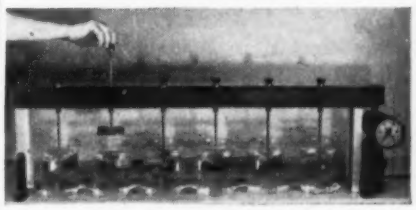

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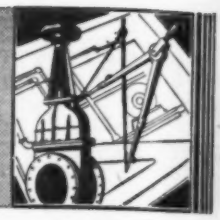

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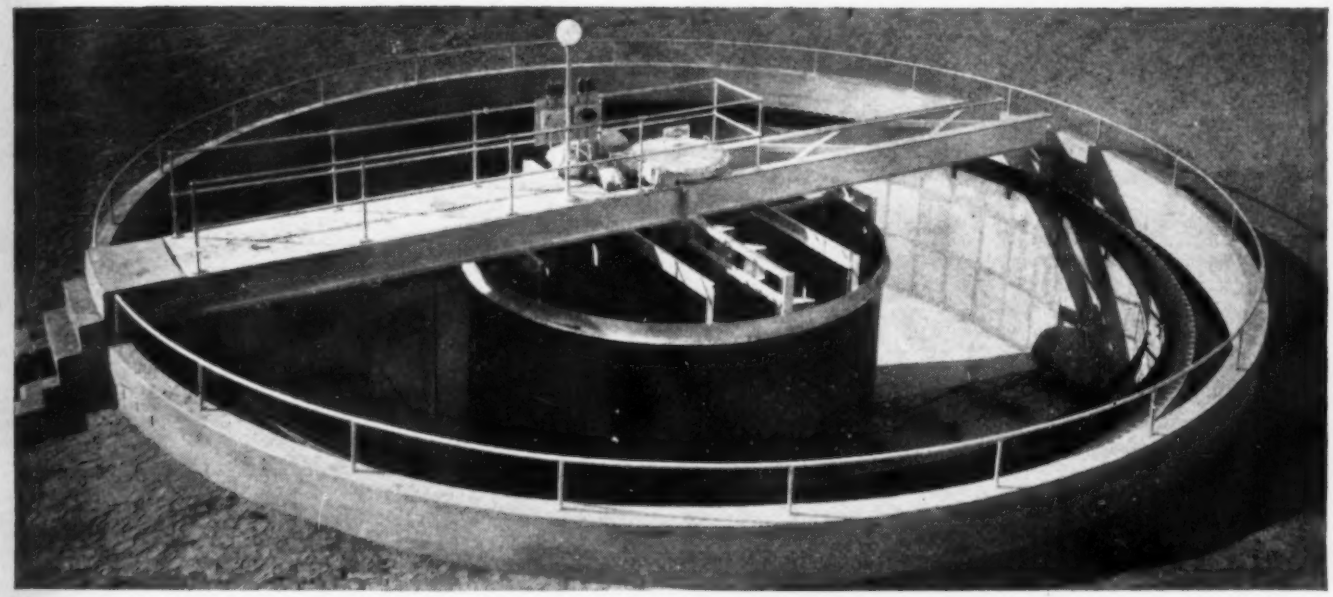
DORRCO Clariflocculators STEP-UP Sewage Treatment Capacity



40 ft. diameter Clariflocculator at Ypsilanti, Mich.

Tests show that Dorrco Clariflocculators produce far better results on raw sewage sedimentation than standard Clarifiers. Flow handling capacity has been increased up to 31.6% and suspended solids removals increased up to 21.6%.

The Dorrco Clariflocculator consists of a Flocculator and a Clarifier in a single tank. The flocculation and settling compartments are concentric and circular in plan, with the Flocculator compartment being suspended above the clarifier floor. Thus, flocculation and clarification are carried out in a single, compact, efficient unit.

THE CLARIFLOCCULATOR OFFERS:

1. Ideal Feed Distribution—below surface through an inverted siphon.
2. Preflocculation Without Chemicals — solids coalesced mechanically.
3. Automatic Handling—of heavy materials which settle in separate Flocculator structures, eliminating periodic manual cleaning.
4. Floc Not Damaged—they are not disintegrated in passing to the sedimentation zone.
5. Perfect Sedimentation Conditions—in an annular zone with decelerated flow to the overflow weir.
6. Seed Flocs Recirculated—to form nuclei for new floc formations.
7. Installed Cost—is less for Clariflocculator than for separate flocculator and clarifier units of a comparable size.

COMPARATIVE RESULTS AT YPSILANTI, MICH. INSTALLATION
40' Dorrco Clariflocculator vs. 40' Dorr Clarifier on weak domestic sewage:

	Greater Capacity at Same Removals (7 weeks average)		Greater Removals at Same Capacity (8 weeks average)	
	Clari-flocculator	Clarifier	Clari-flocculator	Clarifier
Detention—Hrs.	1.9	2.5	2.3	2.3
Overflow rate—gals./sq. ft./day	950	720	800	800
Raw Sewage—p.p.m.	147	147	155	155
Effluent—p.p.m.	68	71	66	82
Removals—percent	53.8	51.8	57.4	47.2
Increased capacity—percent	31.6	—	—	—
Increased removals—percent	—	—	21.6	—

Other tests, of shorter duration, indicate proportionately greater improvements on proportionately stronger sewages.

DORRCO Clariflocculators are normally made in sizes ranging from 20' to 100' in diameter, though larger sizes can be made if required. For additional details write to the nearest Dorr office. There is no obligatio

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